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Money, Inflation, and Deficit in Egypt

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and
Hinh T. Dinh

Despite huge public sector deficits, Egypt has escaped high inflation by depleting three nonrecoverable assets: creditworthiness, money illusion, and enforceable foreign-exchange controls. Without a tough reform program, the country will soon be in a serious crisis.

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Egypt has been able to escape high inflation by depleting its stocks of creditworthiness, money illusion, and enforceable foreign-exchange controls. These nonrecoverable assets are quickly becoming extinct and the economy is on an unsustainable path.

Giugale and Dinh present a short- and medium-term dynamic model of the Egyptian economy and use it to simulate the effects on output and inflation of a stabilization-cum-adjustment program.

Their conclusion: make the public sector live within its means, and do so at once. This is a demanding prescription; political and social pressure can become intolerable under adjustment. But Giugale and Dinh show that both a slowdown in output and the initial rise in inflation associated with a tough reform program will be short-lived (between one and two years).

And a do-nothing strategy will soon push the country into a serious crisis, the correction of which will certainly be more painful. Among other things, Egypt depends on basic imports such as food.

MONEY, INFLATION AND DEFICIT IN EGYPT

by M. Giugale and H. Dinh

Contents:

Our thanks are due to Heinz Bachmann, Sudhir Chitale, Hideo Hashimoto, Carlos A. Rodriguez, Luis Serven and John Wall for their helpful comments and suggestions. William Tyler and Spiros Voyadzis encouraged and supported us to write this paper.

Introduction

Egypt's current economic problems are quite typical of many developing countries. A dominant public role in key productive sectors and an array of administered prices (energy, credit, foreign currency, and the like) twist the system of private incentives against the efficient use of comparative advantages, while output growth is based on fast-growing, trade-impairing domestic absorption. That set-up is enforced through deep public sector deficits financed with a combination of foreign and domestic borrowing and inflation taxation in the context of repressed financial markets.

Naturally, that growth model has one serious dynamic flaw. Barring new resources discoveries, the country eventually becomes unable to honor its foreign commitments (as not enough loans get allocated to relatively profitable investment) and, so, external financing of the public sector's deficit becomes impossible. The government then resorts more heavily to monetization and domestic borrowing (rather, delayed monetization); that is, to inflation taxation.

That inflation feeds on itself. On the one hand, real fiscal revenues fall due to the time lags in their collection (the so-called Olivera-Tanzi effect) and, on the other, domestic money demand shrinks, reducing the base on which the inflation tax in imposed. In the end, the money-inflation circle spirals upwards, calling for tough stabilization programs.

There is, however, one major difference in the recent evolution of the Egyptian system respect to other developing countries. Although the voluntary flow of foreign financing has effectively stopped, and no enough fiscal adjustment has been carried out, ***the economy remains at a (relatively) low level of inflation*** **(even after taking into account the intractable difficulty of measuring domestic prices in a controlled economy like Egypt)**. In other words, ***so far***, Egypt has managed to monetize huge fiscal deficits, with little impact on price stability.

The purpose of this paper is to address the mechanism through which that low-inflation outcome has been achieved, assess its sustainability, and propose and simulate an alternative model for stability and growth. We begin by describing the actual linkages between Egypt's fiscal, monetary and debt policies, as well as their impact on inflation, tracing their evolution over the last decade (Section I). It will be shown that the Egyptian system is ***de facto*** based on the depletion of three assets: ***creditworthiness, money illusion, and enforceable foreign exchange controls***. To the extent that those are non-recoverable goods, it will be argued that the economy is currently in an unsustainable path.

In Section II, we formally present a short-&-medium-term, dynamic model of the Egyptian economy, and we use it to simulate the effects of an (IMF-World Bank-type) adjustment program on output and inflation. It will then become clear that a combination of initially-tough fiscal adjustment and sound monetary programming could put the country back in a path of growth and stability and,

more importantly, could do so in a relatively short period of time. A detailed quantification of deficit and money targets compatible with that outcome is provided.

In the conclusions, we address the underlying implications (and recommendations) for policy making.

I. Fiscal and Monetary Policy, or How has Egypt so far escaped High Inflation?

By all means, Egypt's public sector[1] deficit is huge. Although no truly consolidated accounts are available for the whole public sector, the best proxy for it are the so-called "Central Government Finances", which include results from Local Governments, Public Service Authorities, Net Profit Transfers from Public Sector Companies, and the Investment budget of all Public Sector Enterprises.

In simple cash terms, those accounts show an overall deficit of around 20% of GDP during the 80s. This is roughly twice the size of the public sector's deficit in Argentina, an undisputed front-runner among high-inflation countries in that period. (Charts I and II).

Of course, the "operational" version of the public sector deficit is a more accurate measure of its implied burden on the economy. If agents do not suffer from money illusion, they will make their portfolio and saving decisions according to the (expected) real interest rate that they receive from the government debt, not to the nominal rate[2]. In that sense, the computation of the deficit should take into account real interest payments, not nominal ones. This is precisely the essence of the operational definition of deficit[3]. As long as agents are rational, the usual cash deficit over GDP measure overestimates the real impact of the public sector's results.

Using average nominal interest rates on government domestic debt[4], and actual inflation rates, we have computed an estimate of the operational deficit of Egypt's "Central Government Finances" (which, as explained above includes other

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1/ In the context of Egypt, the public sector includes the Central Government, Local Governments, the Public Sector Companies and the (Service and Economic) Public Authorities. The Public Economic Authorities and the Public Sector Companies are jointly referred to as Public Enterprises. In this paper, "public sector" is broadly defined to include every institution whose overall deficit is or may be financed, directly or indirectly, through money creation (i.e. seignorage and/or inflation tax).

2/ Equivalently, agents will foresee the inflation-pushed dilution in the real value of the government debt.

3/ For a more comprehensive treatment of the operational concept, see Tanzi et.al. (1987).

4/ The Central and Local Government held between 70 and 95% of the total public sector's net liabilities with the domestic banking system over the 1980s.

Chart I

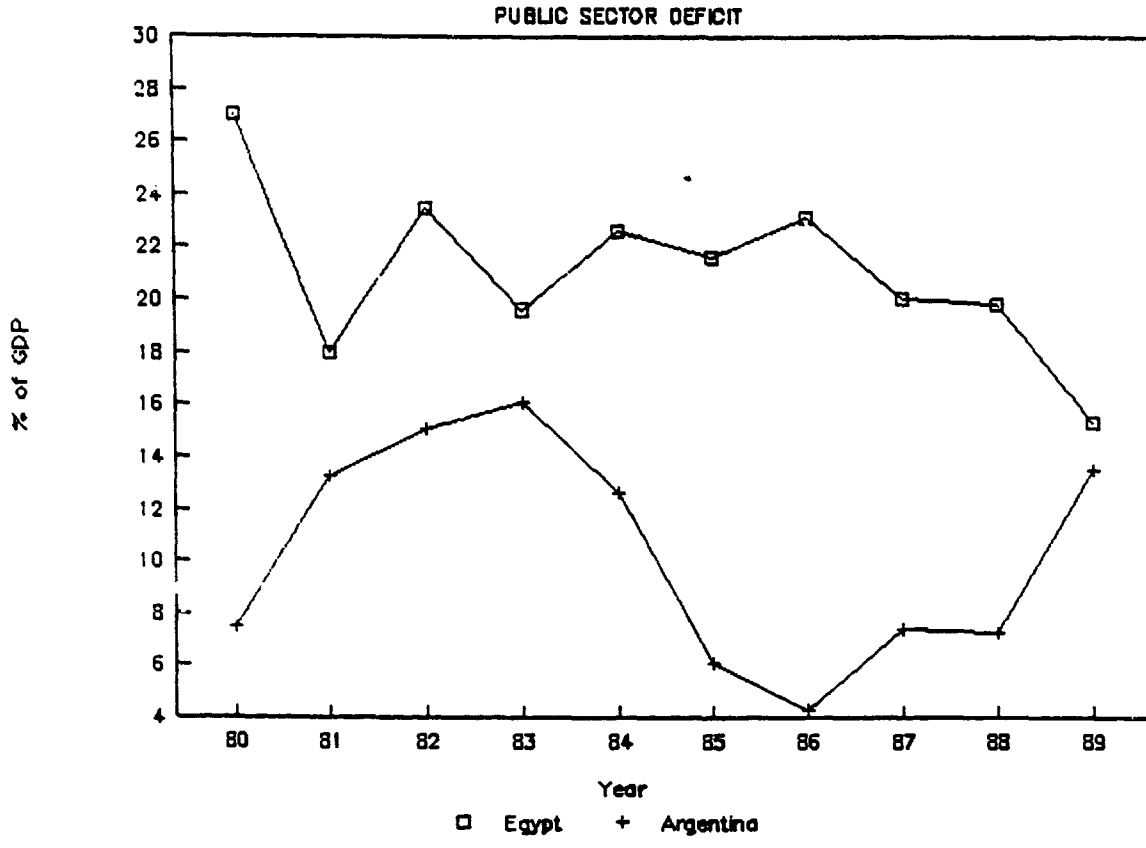
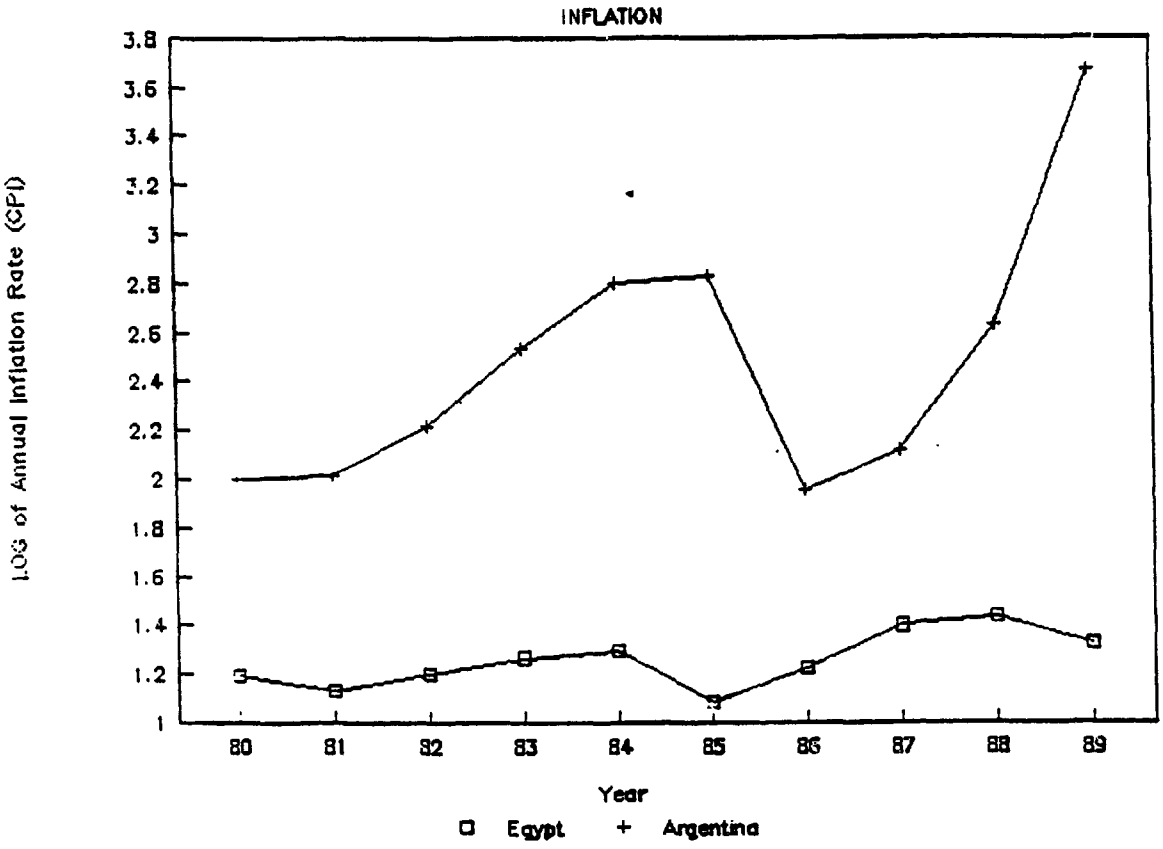

PUBLIC SECTOR DEFICIT
% of GDP
30
28
26
24
22
20
18
16
14
12
10
8
6
4
80
81
82
83
84
85
86
87
88
89
Year
Egypt
Argentina

Chart II


INFLATION
LOG of Annual Inflation Rate (CPI)
3.8
3.6
3.4
3.2
3
2.8
2.6
2.4
2.2
2
1.8
1.6
1.4
1.2
1
80
81
82
83
84
85
86
87
88
89
Year
Egypt
Argentina

portions of the public sector)[5].(Chart III). Interestingly, as percentages of GDP, ***the operational deficit in Egypt is still bigger than the simple cash deficit in high-inflation Argentina (!)*** (with exception of 1989, a year of an abnormal jump in the Central Bank of Argentina's quasi-fiscal deficit; if the latter were excluded the overall cash deficit would be about 7% of GDP in 1989).

One would expect that such high budget deficits would over time lead to higher inflation levels, as the non-inflationary means of financing quickly disappear and private agents run down on their domestic cash balances (contracting the base for the inflation-tax). However, inflation has been rather mild in Egypt. Between 1981 and 1985, the annual rate of change in the consumer price index averaged about 14% , and has since then hovered between 18 and 23%.

In brief, there is enough evidence to say that Egypt's public sector performance is suitable to lead the economy into high-inflation (to say the least). Judging by developing countries' inflation standards, that has not happened, yet.

Naturally, the answer lies on the way the public sector deficits are financed; as long as present and future monetization can be credibly avoided, there is no room for permanent inflation. For instance, a guaranteed, continuous flow of foreign grants would, ceteris paribus, suffice to cover an equivalent permanent deficit, without inflation. Notice that resorting to debt (foreign or domestic) only delays monetization (or fiscal adjustment); in the event, rational agents might discount future money printing and, so, adjust prices immediately[6].

In the case of Egypt, public sector deficits have been monetized only partially during the 80s. Roughly, half of the financing has come from domestic non-CBE borrowing, one-fourth from foreign credit, and the rest from money printing. (Chart IV). As mentioned above, inflation has remarkably fluctuated around "only" 20%. There has been, however, an underlying, particularly large inflation-tax base from which the government collected substantial revenues. In the following subsection, we will argue that such a large base has been the backbone of Egypt's fortunate high-deficit-&-low-inflation outcome.

i) Domestic Debt and Inflation Taxation:

By all accounts, that 20% inflation tax rate looks small. Moreover, one would expect inflation to spiral upwards in the long run, as further domestic borrowing becomes more expensive in nominal terms (perhaps, also in real ones

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5/ By necessity, these are rough estimates. A more accurate computation would require detailed information on domestic and foreign debt arrangements (maturities, expected real interests rates, dates of floatation within the year, the effective exchange rate system for local agents, etc) which are not readily available.

6/ This is Sargent and Wallace's (1982) "unpleasant arithmetic" argument.

Chart III

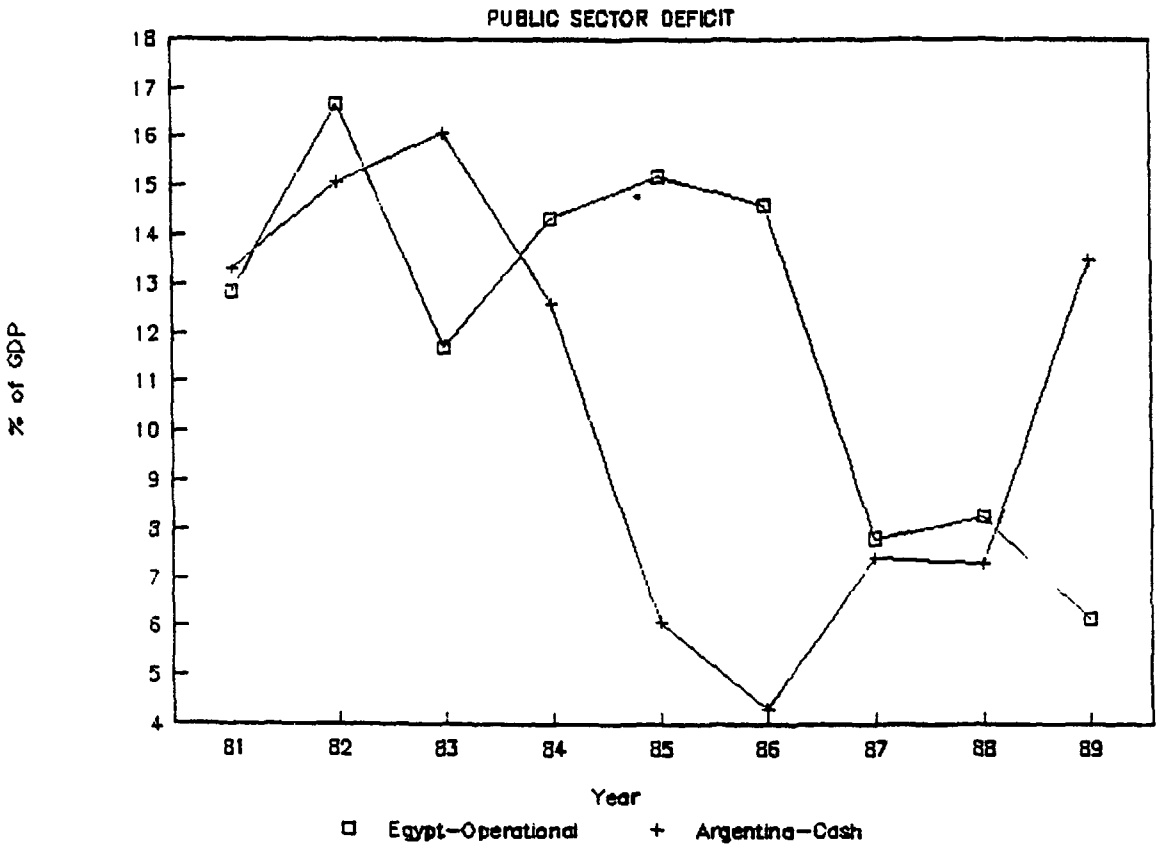
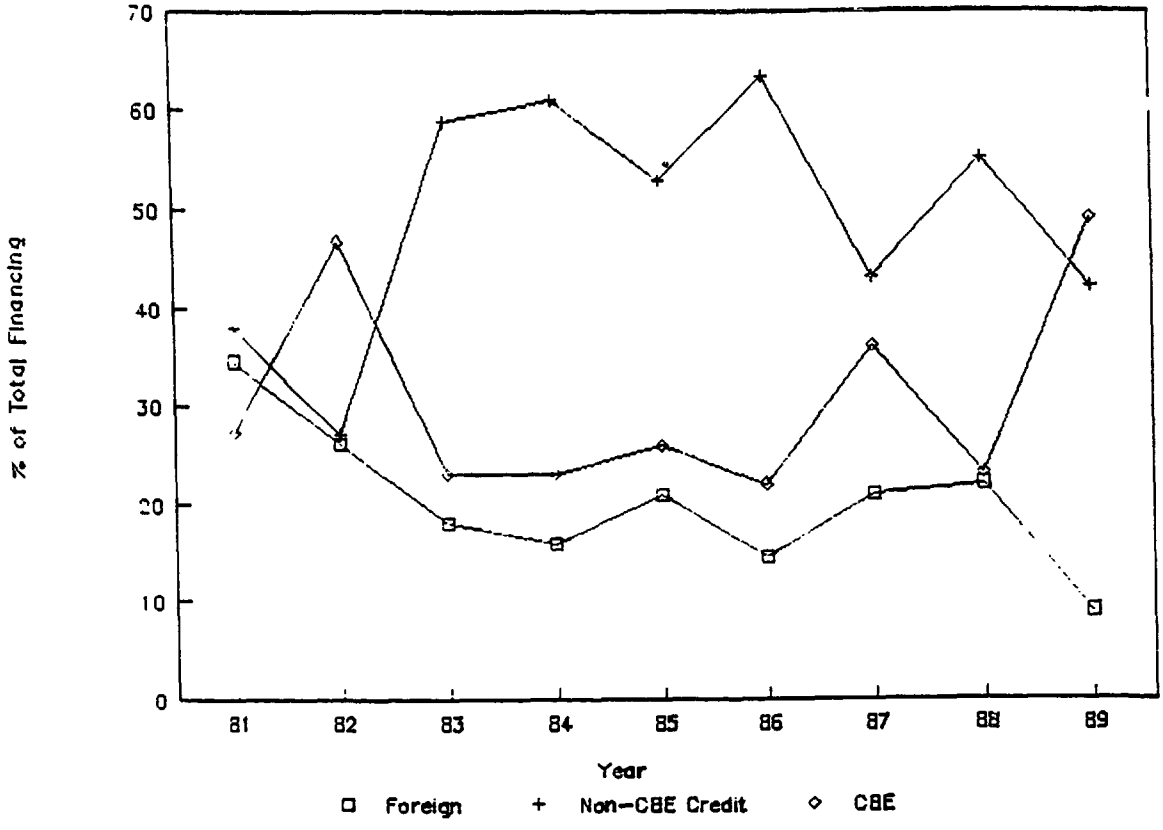

PUBLIC SECTOR DEFICIT
% of GDP
18
17
16
15
14
13
12
11
10
9
8
7
6
5
4
81
82
83
84
85
86
87
88
89
Year
Egypt-Operational
Argentina-Cash

Chart IV

PUBLIC SECTOR DEFICIT FINANCING



as the government becomes a riskier borrower). This has obviously not yet happened, and the reason has to do with the particular arrangements of the government's domestic debt: it has systematically pay ***negative ex-ante real interest rates*** (Chart V). In other words, its real value has been diluted by inflation.

Effectively, then, the inflation tax base has been particularly large, as it has not only included money but government domestic debt papers too. Consequently, the marginal revenue from the inflation tax has been big enough to avoid the need for high inflation tax rates.

It is important to emphasize that that fortunate large-base-cum-low-rate scenario has been sustainable only because ***ex-ante*** real interests were negative. That is, for some reason, there have been investors willing (or obliged) to let their real wealth dilute. Otherwise, they would have demanded nominal rates of return big enough to compensate for their inflation expectations over the bonds' maturity. This would have caused higher nominal deficits and, so (ceteris paribus), higher monetization and inflation.[7]

Naturally, from the ***ex-post*** real interest rate series (as plotted in Chart V) we cannot univocally infer the behavior of the ***ex-ante (or expected)*** one; expectations are not directly observable. Optimally, more sophisticated proxies for expected inflation could be used (ARIMA fittings, instrumental variables estimation of broadly defined equations, inverted money demand models, etc). However, the sheer magnitude and persistence of the negativity of those real rates make it difficult to believe that it is entirely due to forecast errors. (Even rough survey evidence shows that Egyptian agents know before-hand that government debt papers pay negative real returns).

But, if the public sector has indeed been able to collect huge inflation tax revenues through the dilution in the real value of its debt, questions arise as to who holds that debt, and why. Traditionally, domestic public debt has been sold exclusively to local banks and to the Central Bank of Egypt (CBE) (not to individuals). The former have the option to rediscount it at the CBE up to a maximum; they systematically (and immediately) excersice this option, giving further indication that the ex-ante real return on that debt is not appealing (to say the least). Nevertheless, and through various enforcement mechanisms, a quarter of the domestic public net debt remains outside the CBE. (Chart VI).

In principle, it is not very surprising that CBE has been able to afford the

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7/ Of course, it could be argued that the government may have unexpectedly accelerated inflation after floating its debt and, so, may have raised inflation tax revenues from already-locked-up investors. However, that is not a very appealing explanation. It implies that over (at least) a decade the authorities were able to deceive private agents without serious loss of credibility and, hence, without the need to resort to higher and higher inflation surprises.

Chart V

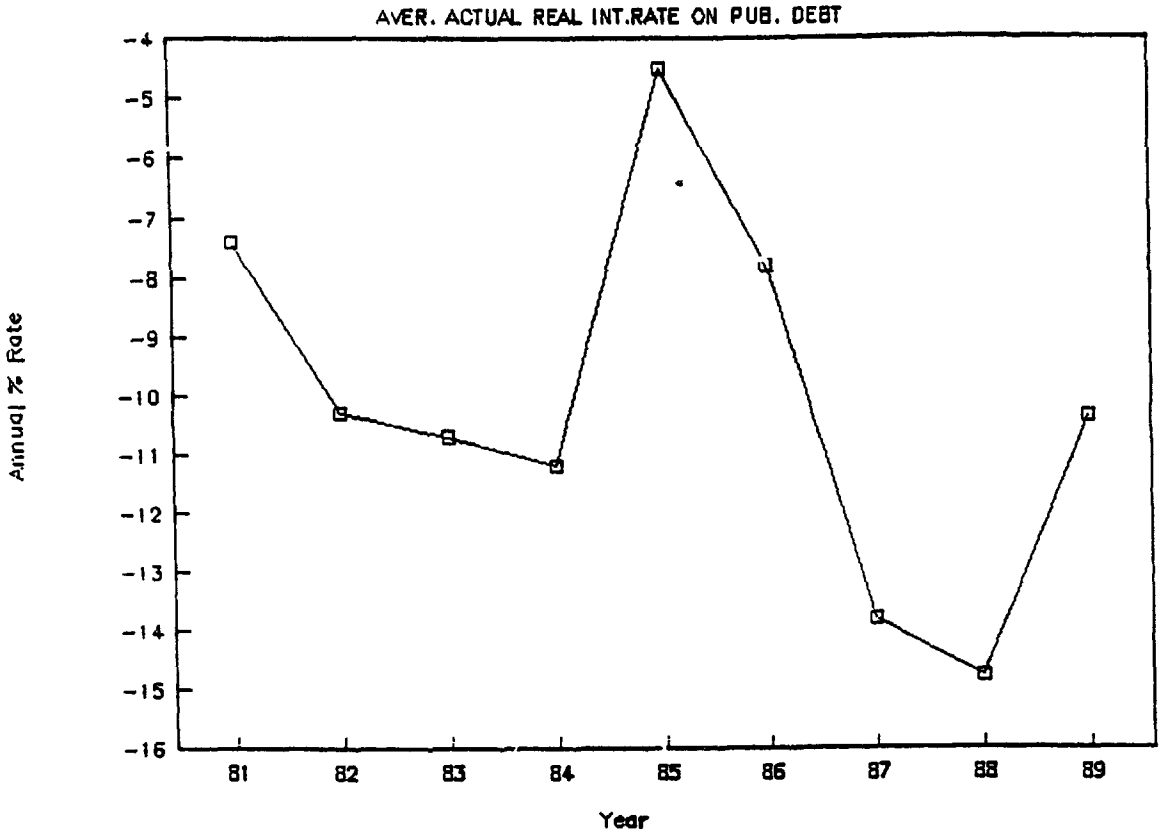
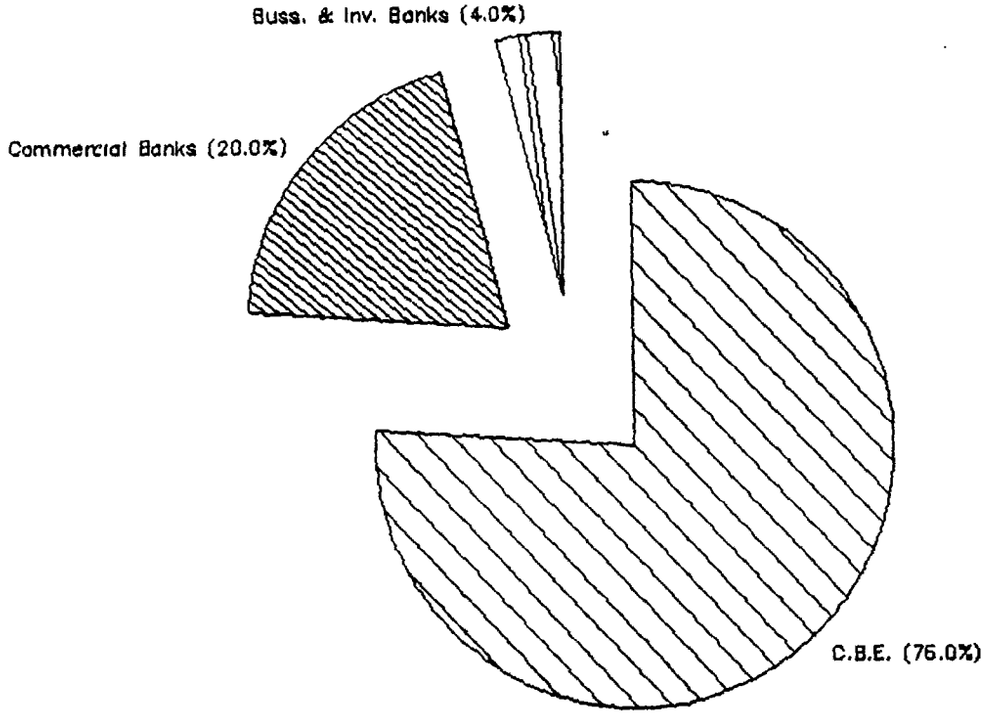

AVER. ACTUAL REAL INT.RATE ON PUB. DEBT
Annual % Rate
-4
-5
-6
-7
-8
-9
-10
-11
-12
-13
-14
-15
-16
81
82
83
84
85
86
87
88
89
Year

Chart VI

NET PUBLIC DEBT HOLDINGS (1989)



dilution of its own holdings of public debt. After all, it can finance itself either by monopolistic profits on its foreign currency trading, by non-remunerated reserve requirements, by simple monetization, or by a mix of them. (In the event, decapitalization may also occur).

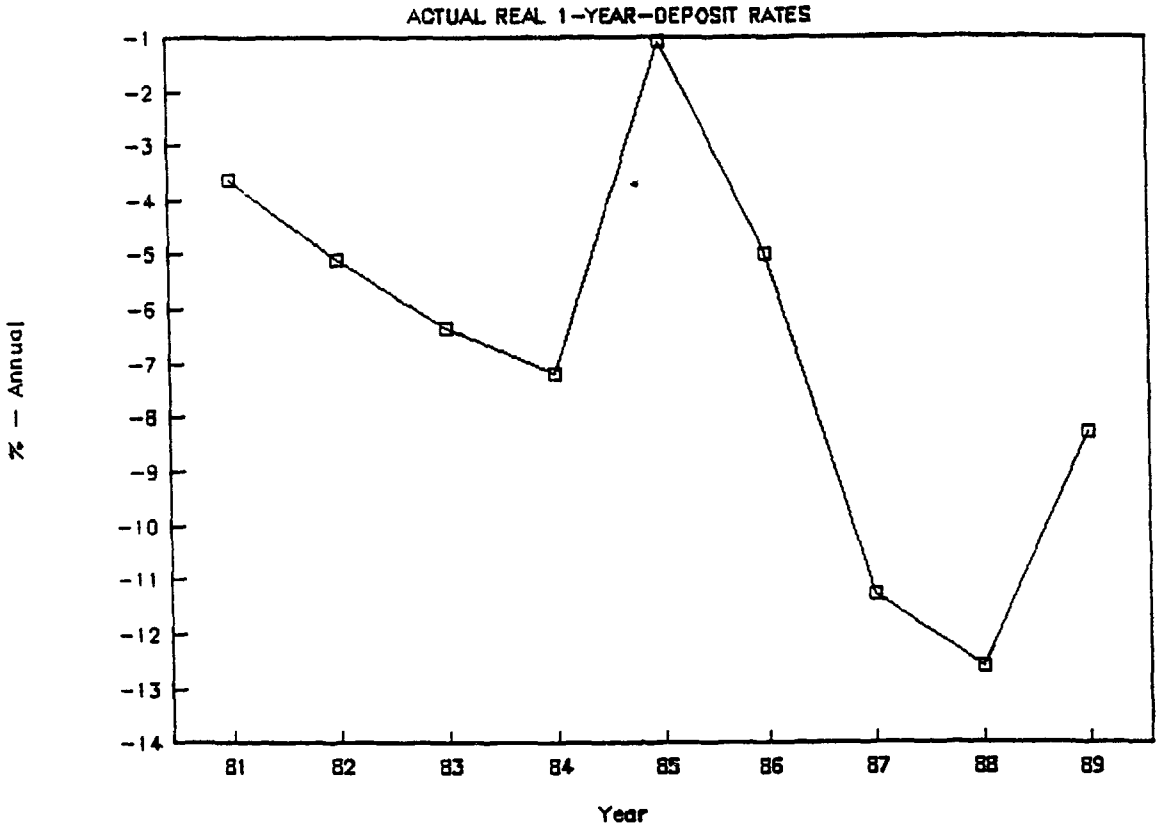
More interestingly, the (non-Central) banking system has also managed to dodge the wealth loss associated to its holdings of domestic public debt. Had it not, it would probably be out of business by now, given the magnitudes involved (i.e. the deep negativity of the real returns). Instead, banks have simply passed through that burden onto their depositors, ***by also paying them negative, ex-ante real interest rates***. (Chart VII). In other words, those depositors have systematically accepted (voluntarily or not) the real dilution of their wealth. By end FY89, private agents held domestic-currency demand and time deposits worth L.E.18 billion, equivalent to more than 100% the then-outstanding money base, even after some portfolio shifting towards foreign currency denominated assets (discussed below) had taken place.

In that context, it is clear that huge public sector deficits can be financed without much inflation; each percentage point of inflation dilutes the real value of ***both*** money base ***and*** of domestic-currency deposits, rendering sizable revenues. In a rational, frictionless situation that could hardly happen; savers would not put their money in deposits if they knew before-hand that the real value of principal-plus-interests upon withdrawal would turn out to be lower (in the Egyptian case, much lower) than the real value of their initial investment. Simple stocking of durable goods, like gold, would be more profitable and equally risky (i.e. riskless). The very contraction in the supply of deposit money would eventually drive nominal interest rates up to positive, expected real levels.

In other words, it seems that private investors irrationality and/or market imperfections (see below) have supplied Egypt with a large inflation-tax base from which it draws (via the banking system) a key portion of the financing of its deficit-ridden public sector. Effectively, those rigidities have saved Egypt from the hardships of high inflation. It is crucial, then, to understand the nature of the rigidities in order to assess the sustainability the model.

Why does a saver put part of his/her wealth in an asset that he/she can rationally expect will loose value? Why do Egyptian depositors accept ex-ante, negative real interest rates? One simple answer reads: those agents are not rational in the first place, they suffer from some degree of money-illusion, and do not fully understand the real implications of inflation. Although we cannot discard this argument outright, it has some weaknesses. First, those depositors are not homogeneous in terms of information; both presumably-uninformed individual savers and professional corporate managers attend the Egyptian deposit market. Second, the deep negativity of real interest rates on deposits has been operative for at least a decade; by now, the real loss of wealth should have supplied savers with a reasonable understanding of the consequences of inflation. If irrationality is the explanation behind Egypt's huge inflation-tax base, the system's stability cannot be taken for granted: sooner or latter, persistent-and-increasing inflation will drive people away from domestic-

Chart VII


ACTUAL REAL 1-YEAR-DEPOSIT RATES
% - Annual
-1
-2
-3
-4
-5
-6
-7
-8
-9
-10
-11
-12
-13
-14
81
82
83
84
85
86
87
88
89
Year

currency deposits, leaving the banking system alone, and possibly unable to cope, with the burden of the under-performing public sector debt.

Another possible explanation for the agents' acceptance of negative, ex-ante real interest rates is the simple lack of alternatives. What else can an Egyptian saver do with his/her savings? The most obvious option is to switch to foreign-currency denominated assets. This is not legally possible in Egypt. The foreign exchange regime is an asymmetric, non-market, administered-exchange-rate system: all legal transactions must be made at one of the official rates, either at the Central Bank or at a network of officially-appointed banks; foreign currency can be sold there (at the corresponding fixed rate) but can be bought only for international trading purposes, on a discretionary rationing basis. Effectively, then, holders of domestic currency cannot legally convert it into foreign one. There is a forex black market but it is heavily policed, and penalties for dealing in it are severe. This leaves the stocking of real goods as the only viable alternative to domestic-currency deposits. The problem is that those goods are, in general, not very liquid and/or costly to store safely. Notably, there exist very active markets for jewelry in Egypt (specially gold) but secure storage costs may be proportionally too big for a small investor.[8]

There is, however, one major handicap in the previous argument. It implies that Egypt's large inflation-tax base is due to the effective policing (rather, suppression) of its black forex market. This trapped domestic savers into real-loss-making deposits, indirectly helping to finance large public sector deficits. The problem is that tough policing of that black market only started after 1987 (year of Egypt's Paris Club agreement) when an official commercial bank rate was established. Prior to that year, there had been (de facto) no suppression of the black foreign exchange market. In other words, the conversion towards foreign currency was an available option during most of the 1980s and, yet, negative ex-ante real interest rates were operative. Also, even for the current foreign exchange controls, the economic incentives from dealing in the black forex market are huge; assuming that the exchange rate there follows an exact purchasing parity power, and that there is no inflation abroad, the maximum value of the percentage bid-ask spread acceptable by customer would be equal to the absolute value of the real interest rates on deposits, around 10%. This should be appealing enough for prospective dealers to keep doing business.

8/ Some extra evidence for the "no-alternatives" argument is given by the creation and rapid expansion of the so-called "Islamic Investment Companies" during 1987-88. These institutions, effectively, managed to offer deposits at positive real interest (or "dividend") rates; that is, their legal position allowed them to dodge the nominal interest rate ceilings prevailing at that time in the rest of the banking system. It is not surprising, then, that the Islamic Companies' domestic-currency deposits grew by about LE 4 billion (as compared to the LE 15 billion money base outstanding at the end of June 1988) in just a couple of years. (A religion-base argument could be put forth to explain the appeal of the Islamic Companies; however, their deposit account were open to, and used by, the general public).

Overall, there seems to be no clear-cut explanation for the holding of underperforming domestic-currency deposits by Egyptian savers. Some mix of "mild" money illusion (specially, at the beginning of the 80s) and foreign exchange market repression (intensified later on) looks the most likely cause. From the policy sustainability point of view, the system is, anyhow, weak. Inflation may have yet not surpassed a critical threshold beyond which real-value losses and/or arbitrage profits become too big to be ignored. In the event, savers will no longer accept the on-going nominal interest rates, withdrawing their implicit support for the banking system which, in turn, will not be able to afford its holding of public debt. In the end, the government will have to accelerate inflation (possibly, in an spiral fashion) in order to raise the same inflation-tax revenue on a now-shrinking base.

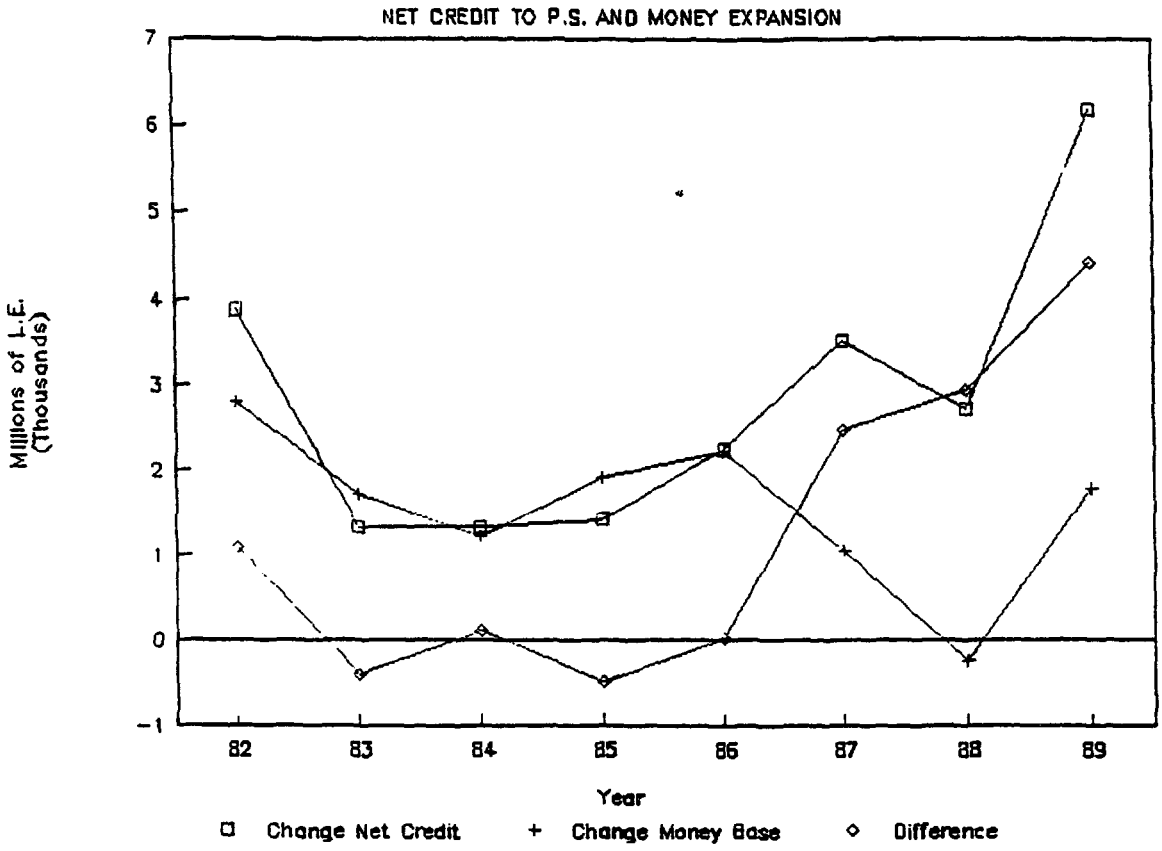
ii) Foreign Financing:

Net foreign credit has played a major role in the financing of public sector deficits in Egypt during almost all the 80s. It has taken the form of grants, project loans, defense-expenditure credits, and the like. After a peak in 1988 (following the 1987 Paris Club Agreement), net foreign inflows appear to have been sharply reduced during 1989 (while debt service payments rose). The country now lacks creditworthiness, and there is little prospect of significant (unconditional) capital injections in the near future.

As a consequence of that fall in foreign help, public sector financing through the Central Bank of Egypt has more than doubled over 1989. This, remarkably, did not mean a shadow increase in money base. Chart VIII shows that the difference between the change in net credit to the public sector and the change in money base has increased by more than 50% over FY89. In other words, the authorities have somehow sterilized the monetary effects of the contraction in foreign financing of the public sector deficit, without adjusting the latter. Effectively, they succeeded in avoiding both high inflation and fiscal discipline, in front of the adverse international credit situation. As explained below, this is by no means sustainable in the medium run.

The mechanism through which that goal was accomplished is the so-called "blocked account", set up in March 1987. Under this arrangement, public enterprises and authorities which are due to pay foreign debt services (87% of Egypt's US$ 52 billion outstanding foreign debt is public and/or publicly guaranteed) pay them ***in domestic currency*** to the Central Bank, at an administered, overvalued exchange rate. In other words, the Central Bank buys up those firms's foreign debt (at a loss), depleting its net foreign assets. As the Bank, then, does not necessarily service its now-bigger foreign liabilities there is no further monetary expansion (in order to buy the foreign currency that would be needed to pay abroad). In terms of the Central Bank balance sheet, this mechanism amounts to a simple swap of assets: an increase in net "Claims on the public Sector" is compensated with a fall in net "Foreign Assets". Or, seen from the liabilities side, the expansion in money base due to the extra financing given

Chart VIII


NET CREDIT TO P.S. AND MONEY EXPANSION
Millions of L.E. (Thousands)
7
6
5
4
3
2
1
0
-1
82
83
84
85
86
87
88
89
Year
Change Net Credit
Change Money Base
Difference

to the public sector is reabsorbed by collecting the domestic-currency "equivalent" of the foreign debt service from local debtor institutions, and then retaining the corresponding payments abroad. Of course, the key of the system is the accumulation of foreign arrears by the Central Bank. In effect, Egypt has so far dodged much of the contraction in *net* foreign financing of its public sector deficit by reducing (formally, delaying with no explicit time limit) the service of its foreign debt.

It is clear that the "blocked account" mechanism can delay money and, hence, inflation expansion only for a while. At some point, arrears accumulation and total loss of creditworthiness will stop the ***gross*** flow of foreign currency, triggering a foreign exchange crisis[9]. This, in itself, will be particularly harmful for a country highly dependent on imports of basic goods (most notably, foodstuff). But more importantly, such a crisis will directly compromise the solvency of the Central Bank, as the blocked account is actually a negative, foreign-currency denominated position. Specifically, the blocked account increased eight-fold since its creation in March 1987 (Chart IX); by end FY89, it amounted to almost ten times the capital of the Central Bank, and about 9% of the country's foreign debt. Clearly, that is too much foreign risk exposure.

iii) Avoiding high inflation: Summary.

During the 80s, Egypt has managed to have huge public sector deficits and relatively very-low inflation. This has been achieved by a combination of a large inflation-tax base and substantial foreign financing (voluntary and non-voluntary). Both sources are extinguishing, quickly.

On the one hand, there are clear signs that a process of currency substitution away from domestic money has begun, in spite of the authorities repression efforts over the black foreign exchange market. The proportion of foreign-currency denominated (demand and time) deposits in private sector liquidity holdings has been growing steadily over the last five years. (Chart X). And this process is unlikely to reverse itself without major changes in fundamentals; namely, without fiscal corrections. Muddling-through type of solutions will not work, both because money-illusion is a non-recoverable asset and because there is a limit to the police grip that can be applied to informal markets.

On the other hand, the country is depleting its creditworthiness through arrears accumulation in order to cover the contraction in gross foreign financing, viciously speeding up that contraction. The Central Bank of Egypt's arrear building, meant to avoid the inflationary impact of large money-financed public sector deficits, cannot be sustained for long. Baring an immediate, major fiscal

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9/ Egypt's inability to meet the so-called "Brooke Amendment" (i.e. service existing US Government debts in order to qualify for further disbursements of US official financial aid) may just trigger that external crisis.

Chart IX

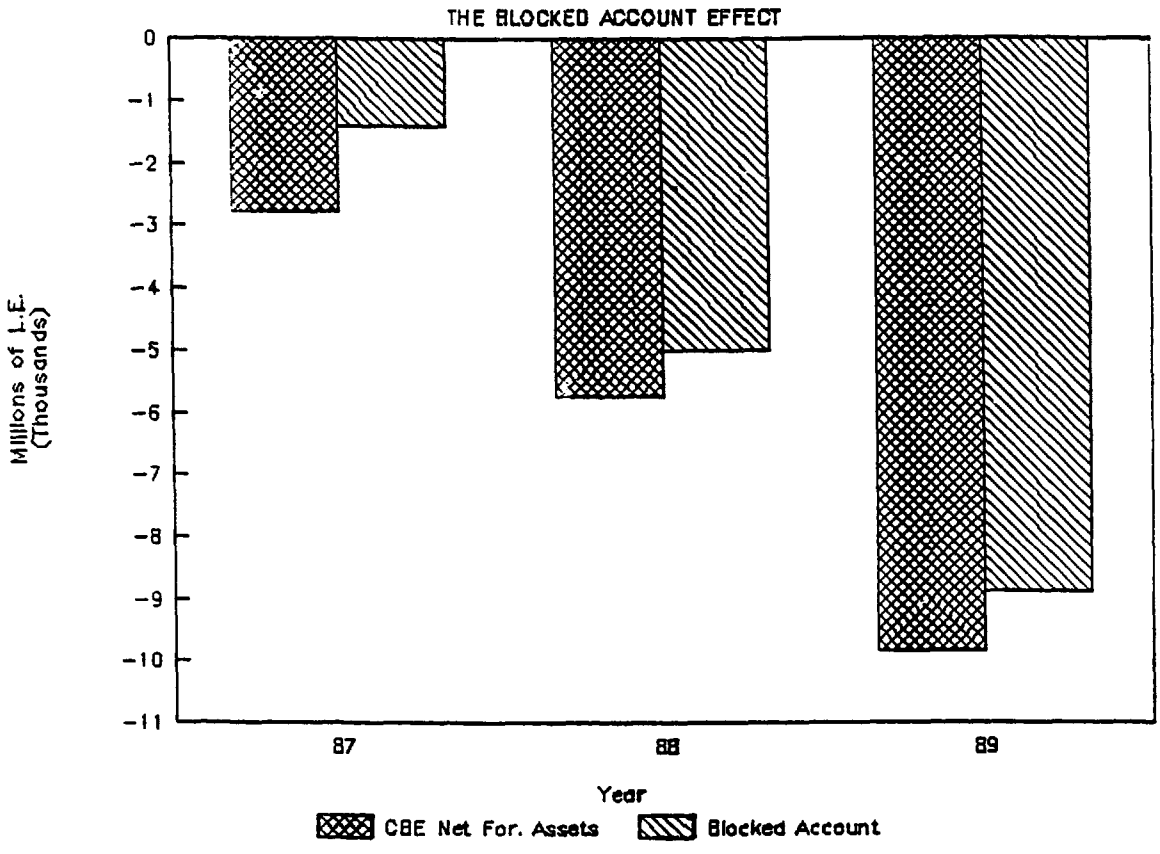
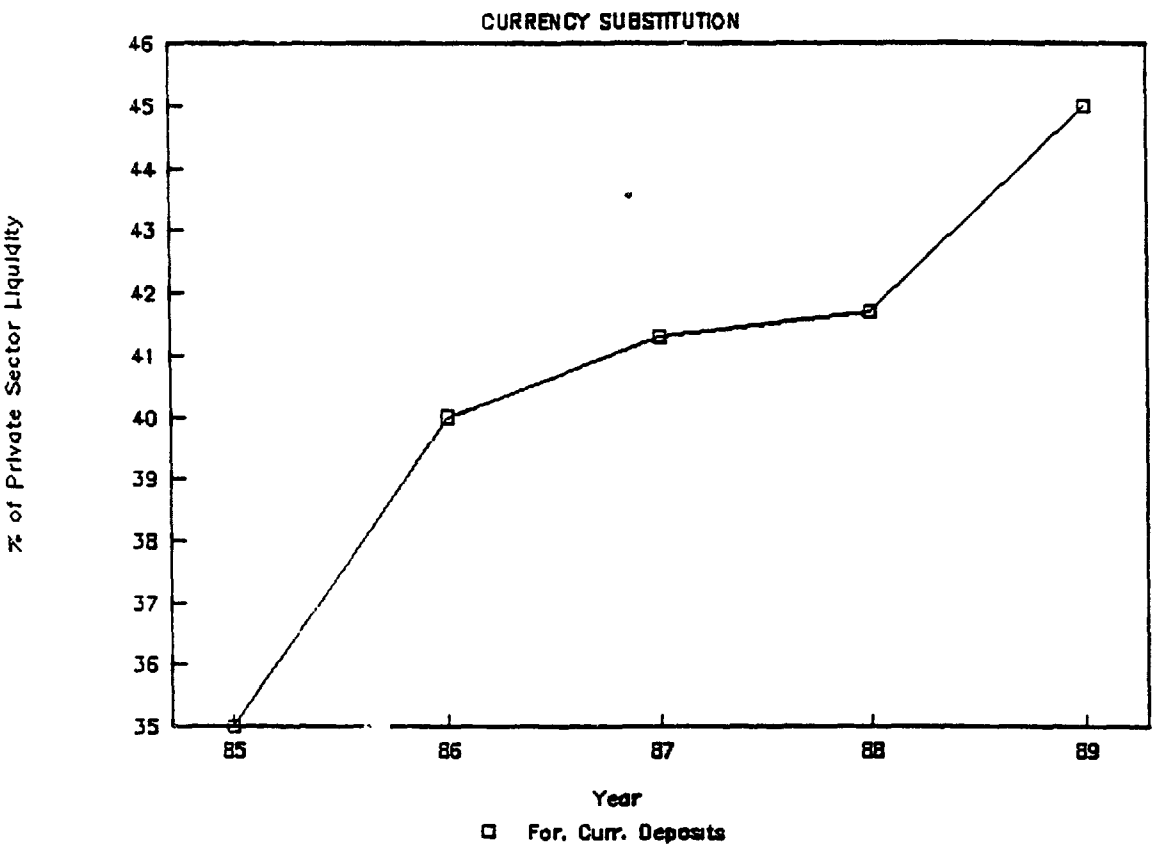

THE BLOCKED ACCOUNT EFFECT
Millions of L.E. (Thousands)
0
-1
-2
-3
-4
-5
-6
-7
-8
-9
-10
-11
87
88
89
Year
CBE Net For. Assets
Blocked Account

Chart X


CURRENCY SUBSTITUTION
% of Private Sector Liquidity
46
45
44
43
42
41
40
39
38
37
36
35
85
86
87
88
89
Year
For. Curr. Deposits

overhaul or an extraordinary foreign aid package, huge money expansions are inevitable in the near future. And inflation will follow suit. In the peak of the crisis, there will be no solution but to adjust the public sector accounts. In the end, the delay will prove to be useless, and the adjustment will be more painful for the Egyptian people.

II. Adjustment, Stability and Growth: A Policy Package for Egypt.

Is it possible to achieve stability and growth in Egypt? Can an IMF-World Bank adjustment package succeed? What are the necessary fiscal and monetary target paths? How should public sector deficits be financed? What will happen to inflation? Given the several policy-imposed, nominal rigidities in the Egyptian economy, what would be output's reaction? Is it possible to keep those rigidities?

It is the purpose of this section to provide an answer to these questions. For that, we set up a simple, dynamic model of the Egyptian economy. Using current starting values, we look for the deficit and money creation levels that, coupled with an IMF-WB-type policy package (devaluation, interest rates increases, and the like), can bring about (permanent) low inflation and output recovery. It should be emphasized at the outset that our model is not meant to be a general piece of macroeconomic theory; it rather tries to give a practical, operational assessment of the short (and medium) run effects of a particular stabilization package on the Egyptian economy. In that sense, country-specific assumptions and parameters are given priority over more general specifications.

v) The Simulation Model:

There are two main nominal rigidities that characterize Egypt's economy: all nominal interest rates have binding, below-inflation ceilings, and the nominal exchange rate is artificially fixed through a non-market system of exchange controls. This particular set-up grants a key role to inflation ***expectations***: they drive both real (ex-ante) interest and real exchange rates. These, in turn, affect agents' decisions on saving, investment, tradable-vs-nontradable goods consumption, and the like.

In that context, the public sector accounts become all important. Money financing of fiscal deficits that lead to inflation changes the ***expected*** real interest and exchange rates, altering the real allocation of resources in the economy. In other words, anticipated nominal changes have real effects in the presence of nominal rigidities. It is clear, then, that the modelling of the sources of money creation is crucial to understand Egypt's economic performance.

There are three major sources of money expansion in Egypt: the public sector's deficit financing (best proxied by the so-called "Central and Local Government" accounts), the system of foreign exchange controls, and the servicing of foreign and domestic debt. As explained in the previous section, the "blocked account" mechanism is effectively a way to reabsorb part of that money expansion (with a counterpart depletion of the Central Bank's net foreign asset position). Hence, the money creation equation for our simulation looks like:

$$(1) \qquad \delta M_t = \Theta_t \, \mu_t \, [TB_{t-1} + NISA_{t-1}] \, e^*_t \; + \; \phi_t \, [\, NINSFD_t + B^d_{t-1} \, i^g_t + (a_t B^f_{t-1} - FA_{t-1}) \, i^f_t \, e_{t-1} \,] \; - \; \Phi \, B^f_o \, i^f_t \, e^*_t$$

$$1 \geq \Theta, \, \phi, \, \Phi \geq 0 \qquad a > 0$$

Equation (1) states that the net change in nominal money base (δM) at any period "t" will be equal to the sum of three factors. First, the non-sterilized portion (Θ) of the section (μ) of trade balance (TB) and non-interest service account (NISA) that is (rather, has to be) surrendered at the Central Bank at the official exchange rate (e^*). Second, the non-sterilized portion (ϕ) of the fiscal deficit monetization; the latter is composed of the primary deficit net of foreign and social-security-related financing (NINSFD), plus the interest (i^g_{t-1}) on the outstanding public sector domestic debt (B^d_{t-1}), plus the interest (i^f_{t-1}) on the outstanding public sector net foreign debt (B^f_{t-1} - FA_{t-1}) denominated in domestic currency (via the free market valuation rate "e") and actually paid after arrears are decided (via the arrear factor "a"). Third, the interest payments on a portion (Φ) of the total foreign debt at the beginning of the simulation is paid into the blocked account at the official exchange rate, reducing the total level of money base[10].

Assuming that no further foreign financing is available, Equation (1) implies a sister equation for domestic debt formation like:

$$(2) \qquad \delta B^d_t = (1 - \Theta_t) \, \mu_t \, [\, TB_{t-1} + NISA_{t-1} \,] \, e^*_t \; + \; (1-\phi_t) \, [\, NINSFD_t + B^d_{t-1} \, i^g_t + (a_t B^f_{t-1} - FA_{t-1}) \cdot i^f_t \cdot e_{t-1}]$$

in other words, domestic debt will accumulate on the basis of the "official" current account result's sterilization and of debt financing of the total fiscal deficit. In turn, foreign debt will accumulate according to the chosen "arrear" factor and to the gross disbursement of foreign loans used to finance the fiscal accounts (D_t), implicit in our variable NINSFD (notice that our arrear factor "a_t" can be use to account for any amortization of outstanding foreign debts, by simply setting it bigger than unity):

10/ Equation (1) assumes that the Central Bank of Egypt is part of the fiscal entity; in other words, fiscal and quasi-fiscal deficits are merged together.

$$(3) \qquad \delta B^f_t = (1 - a_t)\, B^f_{t-1}\, i^f_t + D_t$$

Naturally, the Central Bank's stock of foreign assets (FA) will also accumulate, as it (compulsorily) buys a portion of the proceeds from the country's commercial transfers. Algebraically,

$$(4) \qquad \delta FA_t = \mu_t \, [\, TB_{t-1} + NISA_{t-1} \,]$$

The newly created money will put upward pressure on prices via the instantaneously-clearing money market. The latter's equilibrium will be specified as:

$$(5) \qquad (M/P)_t = \Gamma \, . \, y_t \, . \, \exp\{-\sigma . i^d_t\}$$

Equation (5) simply says that the real money supply (M/P, "P" being the domestic price level) at any time "t" equals the real demand for money. This is defined as a function of real output (y_t), and the domestic, nominal interest rate (i^d_t); "Γ" and "σ" are constants[11]. Clearly, by log-differentiating Equation (5) respect to time, a semi-reduced solution for inflation can be obtained:

$$(6) \qquad \pi_t = (\delta M_t/M_{t-1}) - (\delta y_t/y_{t-1}) + \sigma . \delta i^d_t$$

where "π" stands for inflation, and "δx" stands for the time derivative of any variable "x". We have already specified the money-supply creation mechanism in Equation (1), taking into account the authorities fiscal, financial and foreign exchange policies. Nominal interest rates will also be an exogenously-determined policy variable[12]. It remains, however, to specify the real output formation equation. We have chosen an aggregate-demand-determined mechanism. This implicitly assumes a good deal of idle capacity in the economy and ignores

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11/ It is possible that, in a financially repressed economy, the true opportunity cost of money holdings is the return from having real goods (i.e. expected inflation) rather than the return from an interest-bearing security (i^d). See, for instance, R. Kitchen, Finance for the Developing Countries, J. Wiley & Sons, 1986, Chapter 3. As the stabilization program to be included in our simulation envisages a "flexibilization" of domestic nominal interest rates (in line with inflation), we have preferred to keep the latter as the opportunity cost argument in our demand for money equation.

12/ Naturally, money supply and interest rates can be both exogenous only if credit market controls are enforceable.

supply-side reactions to economic policy. These would be important shortcomings in a general-purpose model; however, in the particular case of Egypt, we have clear indications of widespread factor unemployment (for instance, official labor unemployment figures for FY90 are above 10% of the total labor force) and we do not expect any significant supply-side recovery during the first (two to three) years of implementation of the stabilization-cum-adjustment program. In other words, our simplification of the output equation will render the model's results "short-run (or, rough medium-run), Egypt-specific"; this suffices, however, the purpose of our paper. Specifically, output will be determined as follows:

$$(7) \qquad y_t = TB_t \cdot (e/P)_t + pa_t + ga_t$$

where "pa" and "ga" stand for real private and government (public) absorption, respectively. In turn, the different components of the aggregate demand will be postulated as:

$$(8) \qquad pa_t = \tau \cdot y_t \cdot \exp\{-\beta \cdot (i^d_t - E_{t-1}(\pi_t))\}$$

$$(9) \qquad TB_t = \Omega \cdot (e^*_t / e_t)^{\mu_t} \cdot (e_t / P_t)^{(1-\mu_t)}$$

$$(10) \qquad ga_t = \text{exogenously determined in the fiscal budget}$$

where τ, β and Ω are constants; "μ_t" has already been introduced as the portion of foreign traders that have to surrender their net proceeds at the Central Bank (at the unfavorable "official" exchange rate). Equation (8) tries to capture both income-pushed private consumption and expected-real-interest-rate-driven investment; together, they will account for private absorption. Equation (9) highlights the fact that incentives are different for "official" and "non-official" traders, as the latter have their nominal exchange rate artificially set by the Government and, in that sense, are assumed to look at the gap between theirs and the "free" market's exchange rates.[13]

13/ Equation (9) is mathematically weak as, in general, "TB" can take both positive or negative values; changes in sign may complicate the interpretation of algebraical-value rates of growth. However, the fact that Egypt's trade balance is currently (and, for the matter, has been during the last decades) so deeply in red makes unrealistic to expect any change in sign (i.e. to positive values) in the short and medium run; hence, we have proceeded with our particular specification, gaining in modelling simplicity.

Taking rates of growth in (7)-(10), and substituting as needed, we can obtain a semi-reduced form equation for output growth. That resulting, somewhat cumbersome equation, which we leave for the Appendix, can be coupled with Equation (6) (the semi-reduced form for inflation) in order to get a linear two-equation system where the endogenous are inflation and real output growth, and the exogenous are the policy variables and the world inflation.

To summarize, the exogenous policy decisions relevant to our model are:

i) the size of the public sector deficit effectively financed with money creation; notice that the implied debt financing, in turn, will increase future deficits as it will eventually require servicing (i.e. debt may just be delayed monetization);

ii) the degree of sterilization of the monetary effects of foreign exchange controls[14];

iii) the levels of arrears on foreign debt service (if any);

iv) the nominal interest rate ceilings, both for government debt and for the banking system loans and deposits;

v) the level of the nominal exchange rate at which approved traders have to surrender/buy their foreign currency at the Central Bank (or at its official dealers' outlets);

vi) the size of the government's expenditure on goods and services (i.e. public absorption).

Once those decisions are made, we can find the implied monetary expansion and domestic and foreign debt accumulation. This will have an immediate impact on inflation via the money market. That initial, inflation rate will drive the (ex-ante) real interest rate and the real exchange rate. The former will help determine short-run aggregate demand (mainly through working capital and capital investment credit cost); the latter and the world's rate of inflation will influence the country's trade balance. In the short and medium run, domestic absorption (also fueled by the government expenditure decision) and the trade balance will determine output growth, under the (plausible) assumption that the Egyptian economy is far from full employment. In turn, real output growth will feed back into the money market via the real demand for money. Eventually, the system will reach equilibrium. Final output growth will, then, determine the size of the tax revenues and, so, will enter next year's fiscal (and other) policy decisions. This is the core mechanism of our model, as depicted in Chart XI.

A complete listing of the model's equations, starting values and parameters is given in the Appendix. It should be clear by now, that the model contains three key relationships: i) between the growth of real money demand and the change in nominal interest rate; ii) between the change in real interest rates (on private documents) and the rate of change in real private absorption; iii) between the

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14/ Notice that there is no foreign exchange market as such in Egypt. The Central Bank administers the country's foreign currency reserve by a rationing system. It is clear, then, that the result of the "approved" foreign trade has a direct impact on money base.

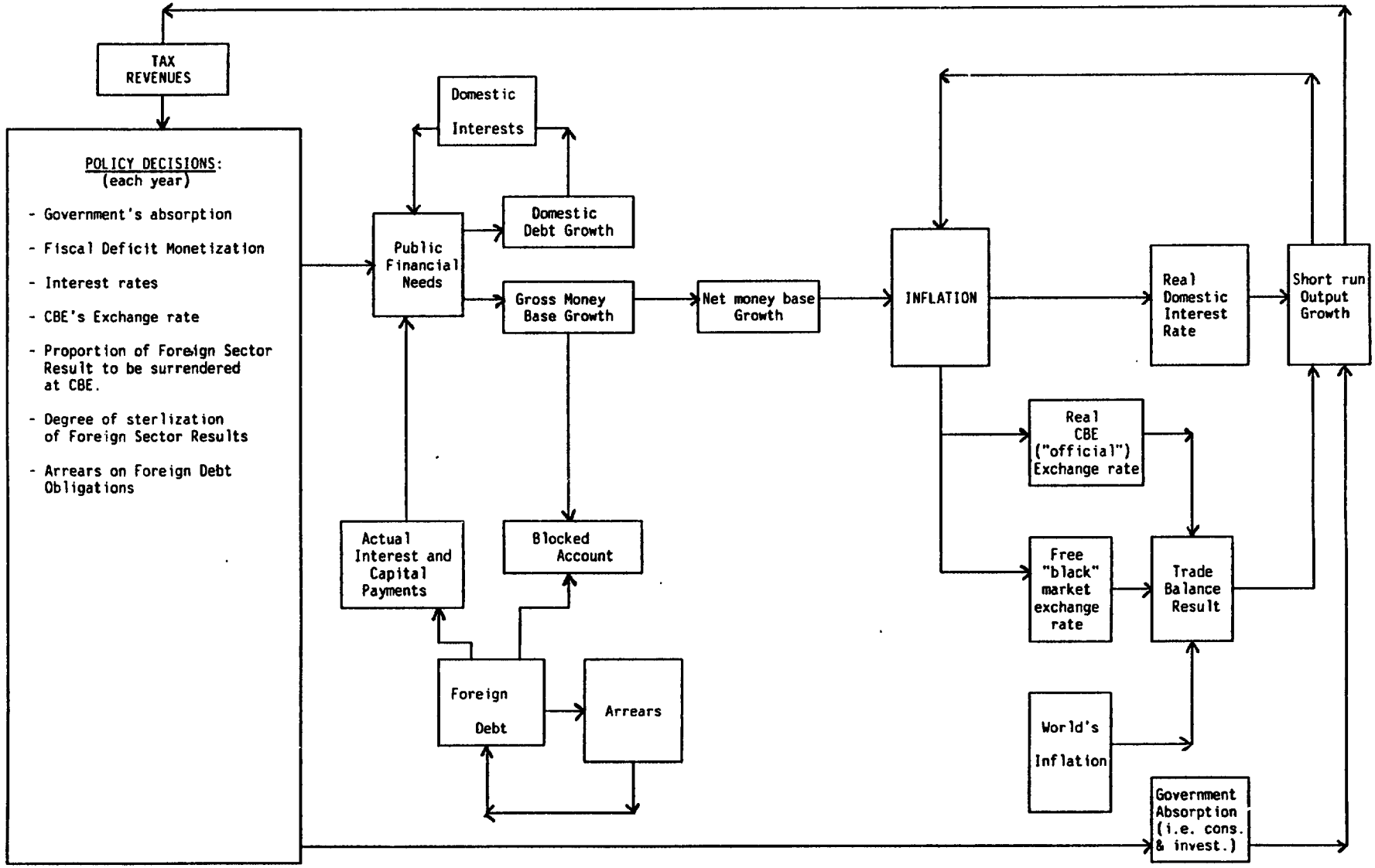

CHART XI: Causality Flow

rate of change of the real exchange rate and the rate of change in the trade balance result. For simplicity, all these relationships have been set linear, limiting the model (rigorous) validity to the neighborhood of equilibrium. The value of the relevant parameters are picked from an array of simulations performed on past data.

v) The Adjustment Program:

The core of the adjustment program that we will simulate in our model can be summarized into:

a. Unification-cum-devaluation (to a 3.6 LE/US$ level, from its current 2.68 weighted-average value --the two-tier official rates are 2.71 and 2--) of the official exchange rates, keeping its real value thereafter; exchange rate controls effectively remain in place;

b. Increase of all domestic interest rates ceilings (on government and private debt) in order to approach, over time, positive real levels; this will initially raise the (one-year-loan) interest rate faced by private agent to 25% (from its current 16% level);

c. Fiscal correction "in line with" the other two measures (see below);

d. The country's reform efforts are to be supported by some form of extra foreign financing or debt relief. Specifically, a US$ 2 billion net foreign inflow is envisaged each year (over the FY91 to FY93 period). This will allow the government to keep the "blocked account" system in place, at least during the first three years of the program.

Our policy package is allegedly similar to the short-term component of an adjustment plan currently being considered by the Egyptian government, with the support of the IMF and the World Bank. However, any comparison needs to be treated with caution. First, the government's program is geared to achieve wider, and essential, structural reforms in the Egyptian economy (like trade liberalization, privatization, public sector's efficiency enhancement, labor-market restriction relaxations, energy prices' international realignment, etc). These very desirable reforms are ignored by our (short-run) model, although they constitute the main reason for the country to engage in an adjustment program in the first place. In that sense, our simulation can be seen only as an effort to trace the short-run effects of that adjustment on output and inflation. Second, our starting point is our preliminary estimate of the Egyptian fiscal accounts as of July 1990; these are subject to changes, specially since the budget is an issue open to negotiation between the Government and the IMF. Third, we will assume that the adjustment program is put in place by July 1st, 1990 and, so, covers the whole FY91. However, the actual program is likely to be delayed well into the calendar year 1992.

Given those handicaps of our simulation, it is clear that the latter should be interpreted as a framework for short-run policy assessment rather than a set of policy recommendations. In the event, the usefulness of the measures undertaken

by the Government will depend on the actual circumstances of the economy at the time of implementation. If any, the merit of our model is to provide a methodology for the assessment of the short-run impact of the adjustment on inflation and output, independently of the nature and timing of that adjustment.

vi) Deficit, Available Financing and Deficit Adjustments:

How much (and what type of) financing will be available for Egypt's public sector if the stabilization-cum-reform program is to be successful? Our answer, projected through 1993, is provided in Part A of Table 1.

Firstly, if the country is truly committed to permanently fight inflation, it needs clear money expansion targets. A simple rule proves effective in our model (see below): ***keep money financing of the government (and its related agents) constant in nominal terms*** (at L.E. 2.3 billion, down from its 1990 level of L.E. 6.8 billion). Optimally, ***make this rule publicly known***; once the commitment is made the eventual loss of reputation may help avoid the temptation of unplanned monetary financing[15]. Moreover, if credible, the implied expected low-inflation will be reflected in private contracts too.

Secondly, the authorities have traditionally resorted to withdrawals from the social security fund, as fast population growth and almost-guaranteed employment schemes have kept it in surplus. The adjustment program will probably revert that; economic activity will slow down (if not recess) in the short and medium run and unemployment will increase. Moreover, real salaries are also likely to fall. In real terms, then, the country's wage bill, to which social security contributions are directly linked, will be flat or falling. It is not longer realistic to assume that the government will be able to increase its withdrawals from the social security fund[16]. To be on the safe side, we assume a complete freeze in the real financing that the government can get from the social security fund at its FY91's level (of about L.E. 5.6 billion).

Thirdly, foreign financing available to the government is bound to become scarce. Although the adjustment program will provide some (initial) debt relief, it is sensible to suppose that the ***net dollar*** flow of foreign help will not increase thereof. In our simulations, we have assumed that net foreign financing of the government deficit is to reach US$ 2 billion upon the implementation of

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15/ Several papers deal with the issue of monetary rules versus monetary discretion. See Barro and Gordon (1983a,b), Lucas and Stokey (1983), Persson, Persson and Svensson (1987).

16/ Inter-generational and efficiency considerations could also be put forward to argue against the public sector (mis)use of social security funds.

TABLE 1

SUMMARY OF GOVERNMENT FINANCES, FY90 TO FY93

	Part A				
	1990	1991b,c	1991a,c	1992a,d	1993a,d
AVAILABLE FINANCING	12186	20171	15171	20412	24389
Foreign (net)	1142	7200	7200	10149	12386
whose US$ value is:	421	2000	2000	2000	2000
Domestic	11044	12971	7971	10263	12003
Nonbank - Soc.Sec.	4200	5597	5597	7889	9629
Bank - Monetization	6844	7374	2374	2374	2374

	Part B				
	1990	1991b	1991a	1992a	1993a
TOTAL REVENUE	19454	30719	35719	50347	61449
Central government	15369	26290	31290	44104	53829
Tax Revenue	11738	18211	22211	31307	38210
Non-Tax Revenue	3631	8079	9079	12797	15619
Local government	985	1269	1269	1789	2183
Public service authors.	500	737	737	1039	1268
Investment self-financing	2600	2423	2423	3415	4168
TOTAL EXPENDITURE	31640	50890	50890	71731	87548
Current expenditure	20942	40404	40404	56951	69509
Wages	6000	7238	7238	10202	12452
Other goods and services	2694	3622	3622	5105	6231
Defense (domestic)	3558	7079	7079	9978	12178
Interests	3614	12751	12751	17973	21936
Subsidies	3760	8125	8125	11452	13978
Other current expend.	1316	1589	1589	2240	2734
Capital expenditure	10698	10136	10136	14287	17437
Investment	10900	10113	10113	14255	17398
Net capital and invs. funds	-202	23	23	32	40
Adjustment-related expend.	0	350	350	493	602
Overall balance before any pass-through	-12186	-20171	-15171	-21384	-26099
Necessary pass-through to fit available finance				972	1710
FINAL OVERALL BALANCE (after pass-through)			-15171	-20412	-24389
(as % of GDP)			-12.24%	-13.63%	-15.10%

(continued)

Memo Items:					
Implied inflation (see model)			40.95%	22.05%	5.68%
Implied real GDP growth			-2.49%	-1.06%	2.10%
Nominal GDP	9[illegible]0		123972	149711	161528
Exchange Rate (LE per US$)	2..1	3.6	3.6	5.07	6.19
Government's Good-&-Serv. Expenditure	18468	22403	22403	31578	38541
Extra Fiscal Effort			5000		
on good-&-serv. expend.			0		
on tax revenue			4000		
on non-tax revenue			1000		

Sources: Egyptian Authorities, IMF, World Bank, and own calculations.
Notes: a/ After the EXTRA fiscal Effort
b/ Before any EXTRA fiscal effort
c/ Money is endogenous
d/ Money exogenous, nominal subsidy pass-through endogenous

the program, and that it will remain constant in nominal dollar terms.[17]

We introduce now another simple rule that our simulation will prove effective in terms of inflation-and-growth (see below): ***keep the so-called "Overall Government Deficit" equal to the available financing described in the three previous paragraphs***. In other words, adjust your net expenses to meet the available, non-inflationary financing (and not the other way around!). As with monetary targets, public announcement of this rule is desirable. The question is: what expense cuts and/or tax increases are needed to fulfill this objective? Our answer, projected through 1993, is given in Part B of Table 1.

As our starting point, we take our (preliminary) estimate of the 1991 actual budget[18]. Upon implementation, that program will have four major impacts on the budget: i) the unification (and increase) of the exchange rates will raise the costs of import-related subsidies (notably, foodstuffs); ii) the increase in interest rates will make credit dearer for public sector companies; iii) there will be extra outlays related to the restructuring of the public sector enterprises (financial rescues, institutional reforms, and the like); iv) the real growth in government's consumption and investment will fall. Of course, the government could avoid part of those extra expenses by, on the one hand, passing-through the higher costs of the (implicit and explicit) subsidies onto the consumers (via corresponding price adjustments) and, on the other, by refusing to help (rather, bail-out) public companies in financial distress.[19] However, to be on the safe (and, probably, realistic) side, we will assume that the government will do nothing to dodge the extra burden associated with the

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17/ Notice that, as explained above, the so-called "Central and Local Government" accounts incorporate the investment expenditures of the whole public sector. Much of the foreign-currency component of these expenditures (imported raw materials, imported machinery, and the like) is covered by ear-marked foreign financing (i.e. project specific loans). Consequently, any devaluation of the Egyptian pound increases both the total domestic-currency investment expenditure of the government and the "below-the-line" domestic-currency-denominated foreign financing available for it. In other words, more domestic money will be needed to finance the public deficit but also more domestic money will be available for that purpose. Under this accounting arrangement, then, the traditional deficit over GDP ratio is not very informative in the presence of exchange rate variations.

18/ It should be noted that this budget estimate assumes that the adjustment program (devaluation, interest rate increase, and so on) is implemented as of July 1st, 1990 and, so, covers the whole FY91.

19/ In fact, it is not even certain that financial costs for public sector companies will be much higher. This is because most (if not all) of their capital debts are long-maturity, fixed-rate obligations. Only the increase in the cost of working-capital finance will have an immediate impact on the public enterprises' performance.

stabilization program.

Under those conditions, it is clear that the implied "Overall Deficit" would be well above the "Available Financing", bringing the need for monetization to L.E. 7.3 billion.(See Table 1). This would put our monetary programing off target by a about L.E. 5 billion. Moreover, the corresponding deficit would in itself be impressive (about 23% of GDP, from about 12% in FY90). How can we, then, adjust the budget to meet the "Deficit-equal-Available-Financing" rule?

In principle, we look for a combination of revenue increasing/expenditure cutting measures able to raise around L.E. 5 billion (by purely fiscal means). However, further cuts on real expenditures (over-and-above the ones the ones already included in our starting-point budget for FY91) will be politically difficult to convey; they would both hurt social-support programs (among which very-low-paid, highly-inefficient, public-sector employment should be counted) and would further depress economic growth (via public investment cuts). Instead, we will assume that the government will close the budget gap only by revenue measures; namely, L.E. 4 billion from higher tax revenue (sale tax, cigarette tax, and the like) and L.E. 1 billion from higher non-tax revenue (mainly, increased energy prices).

Finally, once the overall deficit matches the (non-inflationary) available financing in FY91, how should the government proceed in future years? We introduce here another simple rule (which, again, should optimally be announced): ***index all the items in the budget by the previous-year inflation rate, except for money financing (which is to be kept constant in nominal terms)***. This procedure will bring about a (small) gap between the deficit and the available financing. Hence, we suggest: ***close the gap arising from the nominal freeze on money financing by passing-through an equivalent amount of the extra costs associated with the stabilization program (either devaluation or interest related ones)***. Eventually, this rule will mean the gradual face out of money finance in real terms, as well as will require a lower real pass-through.

In summary, our fiscal prescriptions read:

a) reduce and freeze nominal money financing (to L.E. 2.3 billion);
b) freeze real withdrawals from the social security system at its current level (L.E. 5.6 billion at FY91 prices);
c) expect a constant nominal dollar foreign financing (at FY91 level of US$ 2 billion);
d) get your deficit down to the available financing (probably, through revenue measures only).
e) in subsequent years, cover the real dilution in money financing by an equivalent pass-through of the initial costs of the stabilization program.

Assuming that these prescriptions are followed, we want to find the resulting time paths for inflation and output. We turn to this question in the next subsection.

vii) Inflation and Output in the Full Reform Scenario:

We have simulated the effect of our policy package and fiscal policy recommendations in the context of our model in order to quantify their short and medium run effects on inflation and output.

As explained before, given the fixed nominal exchange and (binding-ceiling) interest rates, the role of inflation becomes crucial. Saving, investment, trading and other resource-allocation decisions will depend on the expected value of inflation (as it drives ***ex-ante real*** exchange and interest rates). One major piece of information for the setting of that value is given by the forthcoming monetary expansion.

Apart from the "2.3-billion" rule for fiscal deficit money financing, three other sources of money creation will be operative: the monetization of CBE domestic debt servicing[20], the "blocked account" system of foreign debt "servicing", and the effect of exchange rate controls. The last two are particularly important upon implementation of the adjustment plan as it involves a steep devaluation of the domestic currency. As the amount of Egyptian pounds needed to service a given foreign-currency obligation increases, more domestic money will be paid into the blocked account; in effect, this extra payments will offset all the other sources of money expansion during the first year of the plan (when a 60%-plus devaluation will take place), leaving the country with a flat ***nominal*** money base. This outcome is obtained even if we assume (as we do in our simulation) that the country (through its Central Bank) honors up to half of its foreign debt servicing commitments, that is, if we increase its actual "arrear" factor from its current, effective 10% to 50%.

Interestingly, we observe that the steep devaluation is effectively disinflationary. This is, of course, only due to the particular institutional arrangement concerning the foreign debt servicing. If the Central Bank fully paid foreign creditors, or the concerned public sector companies were unable to meet their "blocked account" obligations, the behavior of money and inflation would be quite different. In fact, one should expect this system not to be sustainable in the longer run. The idea, however, is precisely to cushion the ***initial*** inflation impact of the adjustment by only partially improving the country's foreign debt servicing performance, in the hope that the efficiency-related measures of the packages (privatization, investment disincentives removal, and the like) will start having effect after two or three years.

It should be noticed that we are assuming away other exogenous changes in money base. In particular, the Central Bank is to refrain from any form of "bail-out" of troubled public sector companies, both directly (through opening credit lines for them) or indirectly (through credit to other banks which, in turn, lend to those companies). This discipline will be hard to maintain, as the reform

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20/ And of any other institution whose domestic debt is effectively serviced by the Central Bank of Egypt.

program will shake many public corporations and the calls for protection will abound. Much of the success of the program, however, will depend on the effective commitment of the Central Bank to its pre-set monetary targets

Baring exogenous deviations, our model predicts an immediate disacceleration in money base growth. In fact, nominal money base will stay flat or decline over the three first years of the program's implementation, having a sharp fall in real terms during the same period (Chart XII). As explained above, this behavior is mostly due to the liquidity-absorbing effect of the devaluation through the blocked account system. Also, our low-money outcome obtains under a given set of policy parameters; namely, the degree of sterilization of the monetary effects of foreign exchange controls, the money-vs-debt financing choice at the Central Bank itself, and so on. We have used values for those parameters in line with the observed modus-operandi of the Egyptian authorities in recent years; by all means, this looks very money-biased (See Appendix for exact figures).

In spite of the tight monetary policy, the rate of inflation will jump during the first year of the stabilization effort and will, thereof, decline steadily (Chart XIII). The upward pressure will come from the several relative price corrections that the government will introduce into its array of administered prices (most notably, exchange and interest rates) as well as from the recession-pushed contraction in real money demand. As most of those corrections will take place during the first year of the reform, inflation in FY91 is to increase to around 40% (from its FY90 level of 25%) even though the monetary tightening will be at its toughest point (***nominal*** money base will hardly change during FY91). This further highlights the need for monetary discipline: if the country gets into its reform program with no commitment to dear money, it will risk having huge initial inflation; in the event, political pressure will halt the whole program (as, in the unindexed Egyptian economy, real wages will plummet). In other words, stabilization is a necessary condition for successful structural reform. If, instead, the authorities stick to their initial policies, our model predicts a sharp disacceleration in inflation over the following two fiscal years (to 22% and 5% for FY92 and FY93, respectively).

Given the inflation results described above, what will be the short-and-medium run behavior of output? The answer lies on the policy choice for the nominal interest rate ceilings and for the nominal level of the fixed (rather, controlled) exchange rate. Once those choices are made, ceteris paribus, higher expected inflation means lower expected real interest rate and higher domestic absorption growth. Similarly, the higher expected inflation at home as compared with the world's rate, the faster the appreciation of the real exchange rate and, so, the deeper the deterioration of the country's trade balance.
It should be notice that, in the context of our model, expected and actual inflation rates are assumed identical. In general, this could only be true if private agents were rational and they knew the government's policy package with certainty (and no other exogenous shocks to inflation were operative). Our recommendation about the need to announce (and stick to!) fiscal and monetary targets is meant precisely to help the private sector's formation of inflation expectations.

Chart XII

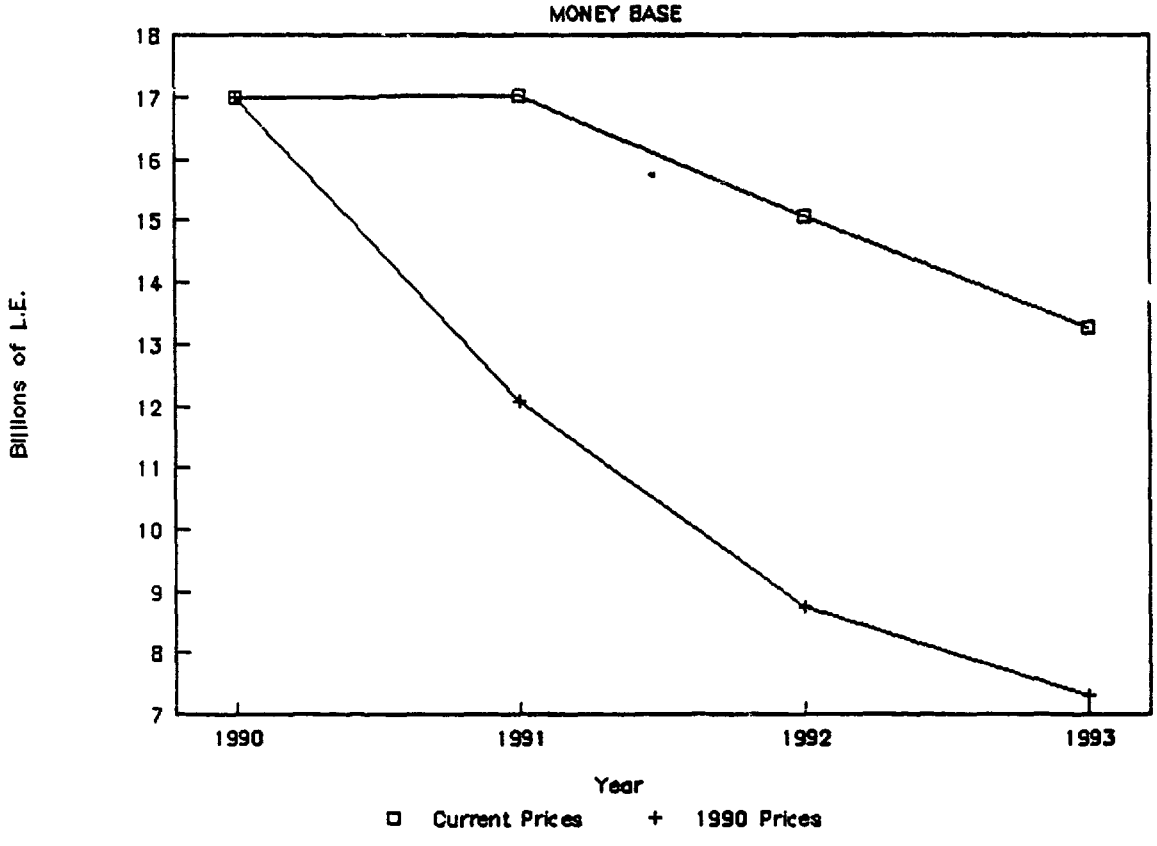
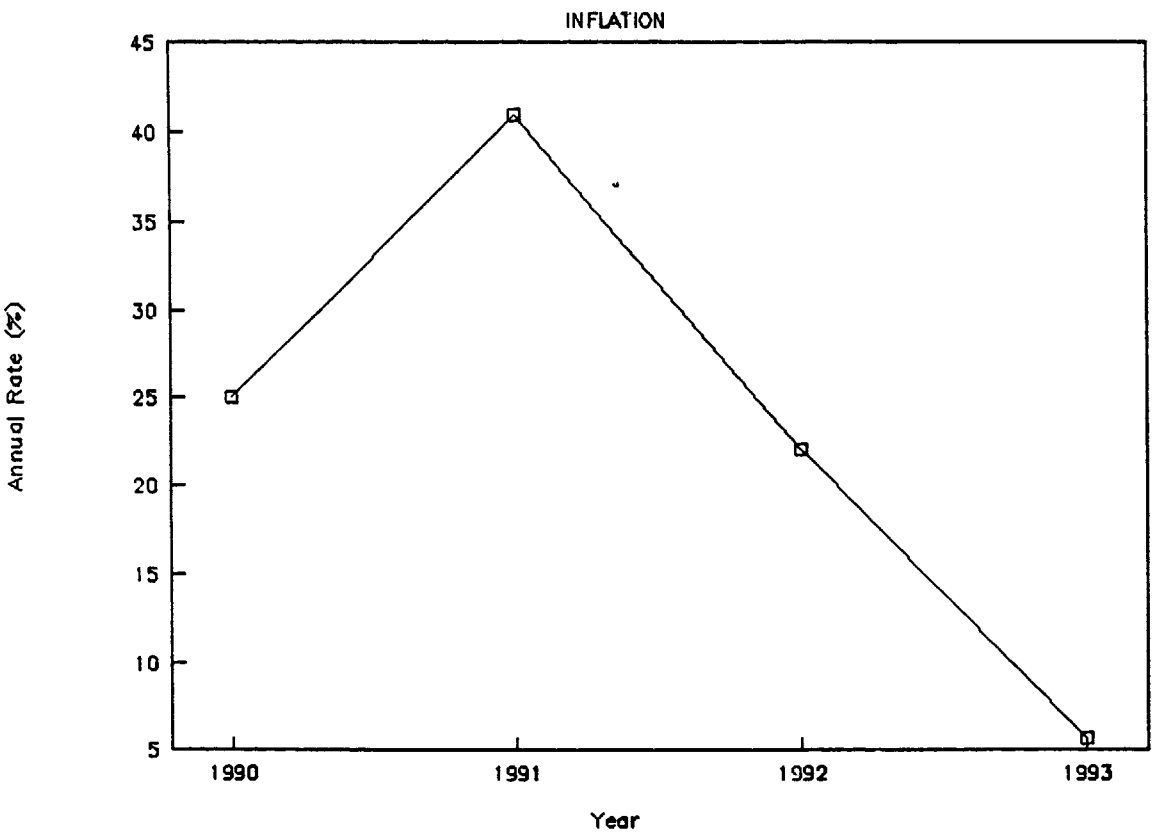

MONEY BASE
Billions of L.E.
18
17
16
15
14
13
12
11
10
9
8
7
1990
1991
1992
1993
Year
Current Prices
1990 Prices

Chart XIII


INFLATION
45
40
35
30
25
20
15
10
5
Annual Rate (%)
1990
1991
1992
1993
Year

Following our policy package, we will assume that nominal (lending) interest rates are raised to 25% (from their current 16% level) upon implementation of the plan, and later reduced (to 20 and 15% in FY92 and FY93, respectively) as inflation slows down. As for the exchange rate, it will be unified-cum-devalued (from its current average of 2.68 L.E./$ to a unique 3.6) and subsequently kept in line with (ex-post) inflation.

Our simulation-generated estimate of the GDP's behavior is, then, as follows:

a) In the first year (FY91), though nominal interest rates will be substantially increased (in our simulation from 16 to 30%), real interest rates will remain (deeply) negative, helping real aggregate demand growth. However, the steep devaluation of the official exchange rate (about 40%) will be more than offset by domestic and foreign inflation, keeping the dollar trade balance unchanged. This latter effect will be compounded by the strong disacceleration in real government expenditure's growth (consumption and investment) and, together, will revert the positive effect on aggregate demand from the negativity of real interest rates. In the end, GDP growth will be negative, at about -2.5%.

b) In the second year, the disacceleration in inflation (from 40% to 22%) will bring the real interest rate up to close-to-positive values, while the official exchange rate will depreciate heavily in real terms. Also, our fiscal rules will assure that real government expenditure will remain constant. Overall, the increase in real interest rates will dominate, and our aggregate-demand-driven real output will remain stagnant (contracting by a full percentage point).

c) Finally, in the third year, yet lower inflation will drive real interest rates well onto the positivity range. However, the real-terms devaluation of the official exchange rate will be strong enough for the economy to have positive real output growth (in spite of the operative freeze in real government demand); the latter is estimated at about 2% in FY93. (Chart XIV).

viii) Inflation-Output Growth Tradeoff in FY91: A Digression.

What are the possibilities currently open to the Government with respect to short-term inflation and growth? In principle, the authorities could achieve faster economic growth during FY91 by straightforward money-financed expansion of their own expenditures. This, of course, will have important medium and long-run consequences on the economy's performance (crowding-outs, loss of monetary credibility, aggravated current account positions, loss of any remaining international creditworthiness, etc.). Still, we have found interesting to analyze the possible inflation-growth combinations that could be obtained under an array of money-financed real government expenditure's growth rates. Those combinations are depicted in Chart XV. Two main comments seem relevant. First, even at zero real growth, the Egyptian economy is bound to suffer high levels of inflation (over 50%). Second, each extra percentage point of real growth roughly "costs" five percentage points of inflation. It should be noticed, however, that our trade-off (or "Phillips") curve is linear (so is the model

Chart XIV

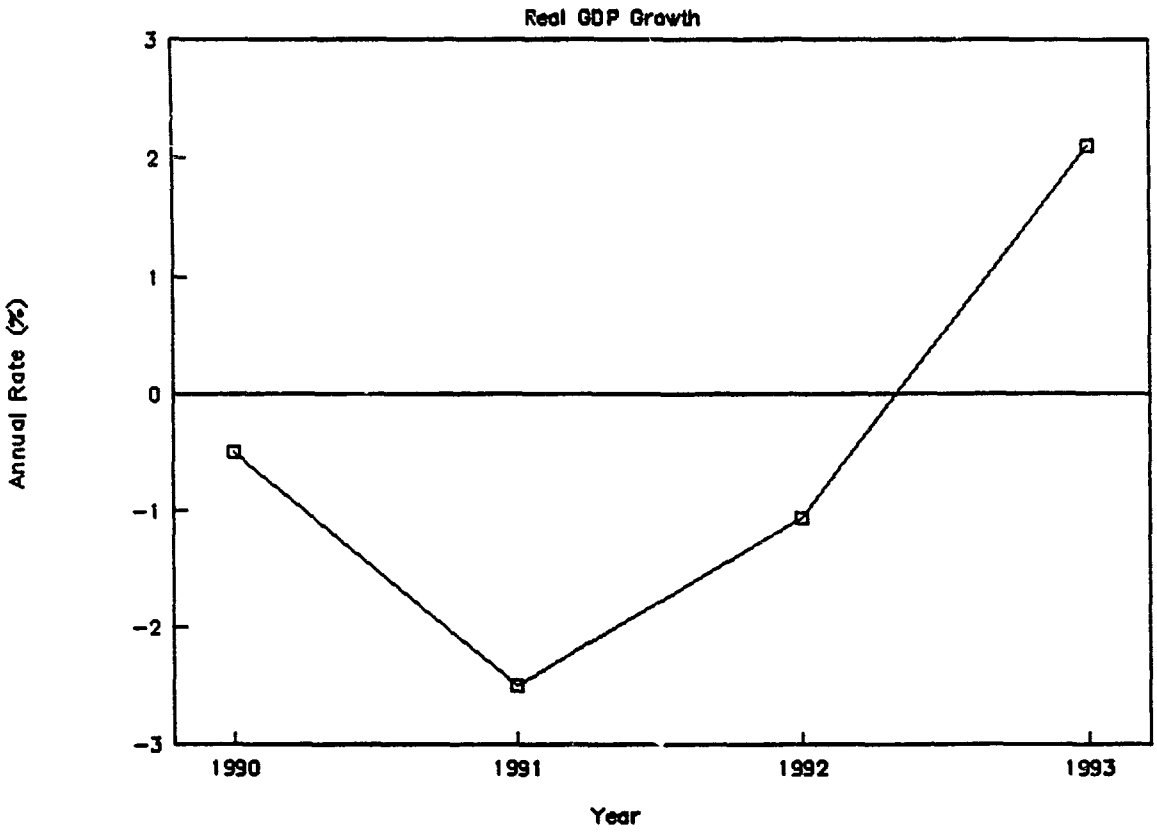
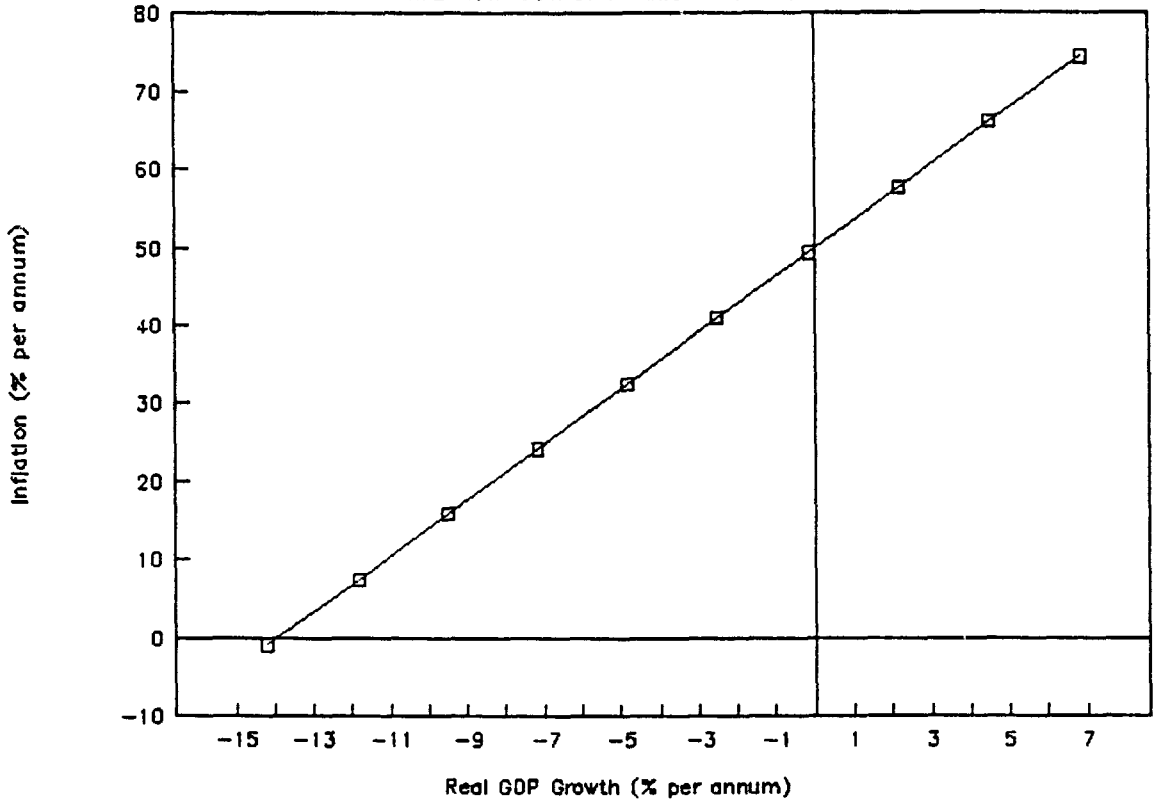

Real GDP Growth
Annual Rate (%)
3
2
1
0
-1
-2
-3
1990
1991
1992
1993
Year

Chart XV

INFLATION-OUTPUT TRADEOFF FOR 1991



behind it); it should rather be interpreted as a Taylor-linearization of the actual function and, so, as only valid in the neighborhood of equilibrium (i.e. in the short-run).

ix) Summary and Extensions:

It is clear that the public sector financing requirement is the anchor of the stabilization program described above, specially in terms of money finance. The overall fiscal deficit is to adjust (down) to meet the available financing. The latter, in turn, is shown to be disinflationary, given the existing arrangements on the foreign debt. As for GDP growth, it will mainly be driven by the swings in real interest rates and by the real exchange rate devaluation.

Needless to say, then, that the centerpiece of the whole plan is the government success in cutting down the public sector deficit to the available non-inflationary financing path. In fact, should the authorities be successful in following that path, other policies may start looking irrelevant or redundant. For instance, the implied tightening on money creation may render the exchange rate controls unnecessary, as agents find the holding of domestic-currency-denominated assets much more appealing (assuming they have confidence, and evidence, that the government sticks to its plans). In that sense, our IMF-WB-type policy package may not look comprehensive (e.g. it does not call for a total liberalization of exchange rates and/or interest rates); we have shown, however, that, coupled with fiscal and monetary discipline, it does provide a basic but important set of policies that can take Egypt back to price stability and growth.

Also, our model starting values correspond to end calendar year 1989. The speed at which events are happening both in the economic and political arenas in Egypt is likely to quickly render our results outdated. Baring major structural changes, however, our model could be easily "rebased"; if any, this paper's contribution is precisely to offer a framework for short-and-medium policy simulation. In the end, it is up to the Egyptian authorities to decide whether, when and how a stabilization-cum-reform effort is needed.

Conclusions:

The Egyptian policy-makers have managed to run huge public sector deficits with relatively-low inflation results. This has allowed the country to force itself into a fast real growth track which is independent of the economy's comparative advantages; ever-growing domestic absorption has driven both output and trade deficits. Effectively, this policy has been financed through the depletion of the country's stocks of creditworthiness, money illusion and enforceable foreign exchange controls.

Whether that growth model constitutes a desirable development strategy or not, depends upon the policy-makers' preference map; it is only possible that they may have found social priorities and rates of return that fully rationalized their actions, even under the most rigorous principles of economic management.

However, the assets on which the system is founded (creditworthiness, money illusion, enforceable foreign exchange controls) are now at the border of disappearance, and no quick recomposition is feasible. Whatever its past merits, the existing economic model is exhausted, and heading for collapse. A change in the country's development strategy is needed. And this is true independently of any social preference function.

In this paper, we have provided a (limited) analysis of the short-and-medium run effects of one possible policy approach. Our bottom-line message reads: ***put the public sector to live inside its non-inflationary means, and do it at once.*** We realize that this is an very demanding premise: political and social pressure can become intolerable under the adjustment effort.

However, we have shown that both the slow-down in output and the initial rise in inflation associated with a tough reform program will be short lived (between one and two years). In contrast, a do-nothing strategy will soon push the country into a serious crisis (as Egypt is dependent on basic imports, like foodstuff), whose correction will certainly be more painful.

There is no doubt, then, that the Egyptian policy-makers must act immediately. But, we have not yet demonstrated that a simple muddle-through approach could not suffice. In our view, the very nature of the assets on which the current economic order is based renders that approach ineffective. The reasons are simple. First, Egypt will not recover its creditworthiness if the international lending community (official and private) does not see a significant change in the country's economic attitude; only tough adjustment efforts, specially in the public sector accounts, can convey that message. Second, it will take lots of very-conspicuous monetary discipline to convince local agents to reverse their portfolio allocations into domestic-currency denominated assets; in effect, lost money illusion cannot be recovered. Thirdly, there is little room for strengthening the existing foreign exchange controls; in the end, the marginal political and financial cost of a tighter grip will outweigh its benefits, as marginal agents will find forex dealing "too rentable" to be dropped.

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APPENDIX

Model's Equations and Notation

Money Market:

(1) Money Demand:

$$(M^d/P)_t = \Gamma \cdot y_t \cdot \exp\{-\sigma . i^d_t\}$$

(2) Money Supply:

M^s is exogenously determined; see below

(3) Equilibrim in Money Market:

$$(M/P)_t = \Gamma \cdot y_t \cdot \exp\{-\sigma . i^d_t\}$$

(4) Partial Solution for Inflation [from taking rates of change in (3)]:

$$\pi_t = (\delta M_t/M_{t-1}) - (\delta y_t/y_{t-1}) + \sigma . \delta i^d_t$$

Goods Market (unemployed economy):

(5) Aggregate-Demand-Determined Real Output:

$$y_t = TB_t \cdot (e/P)_t + da_t$$

(6) Total Domestic Absorption:

$$da_t = pa_t + ga_t$$

(7) Private Domestic Absorption:

$$pa_t = \tau \cdot y_t \cdot \exp\{-\beta.(i^d_t - E_{t-1}(\pi_t))\}$$

(8) Government's Domestic Absorption:

ga_t is exogenously determined in the budget

(9) Trade Balance Growth:

$$(\delta TB_t/TB_{t-1}) = \Omega\ [\ \mu_t\ (\hat{e}^*_t - \hat{e}_t)\ +\ (1 - \mu_t)\ \ (\hat{e}_t - \pi_t)\ ]$$

(10) Devaluation in "black" Forex Market (PPP is operative):

$$\hat{e}_t = [\ (1 + \pi_t)\ (1 + w\pi_t)^{-1}\ ] - 1$$

(11) Real Output Growth [from taking rates of growth in (5), and using (6)-(10)]:

$$(\delta y_t/y_{t-1}) = (\phi_1.\Omega.\mu_t)\ \hat{e}^*_t\ -\ (\phi_1.\Omega.\mu_t + \phi_2)\ \pi_t\ -\ \phi_1.[1+\Omega(1-2\mu_t)]\ w\pi_t$$
$$-\ (\phi_3.\beta)\ [\delta i^d_t - \delta E_{t-1}(\pi_t)]\ +\ \phi_2\ .\ \hat{G}$$

where:
$$\phi_1 \equiv abs(TB.e)\ /\ abs(TB.e + G)$$
$$\phi_2 \equiv G\ /\ abs(TB.e + G)$$
$$\phi_3 \equiv A_p\ /\ abs(TB.e + G)$$

Inflation Formation Mechanism:

(12) Perfect Foresights:

$$E_{t-1}(\pi_t) = \pi_t$$

Semi-Reduced-Form Solution of Inflation and Real Output Growth

(13) Inflation:

$$\pi_t = \text{¢} \cdot \{ (\delta M_t/M_{t-1}) - (\phi_1 \Omega \mu_t) \hat{e}^*_t + \phi_1 [1+\Omega(1-2\mu_t)] w\pi_t + [\sigma + \phi_3 \beta] \delta i^d_t + [\phi_3 \beta] \pi_{t-1} + \phi_2 \hat{G} \}$$

where $\text{¢} \equiv [\ 1- (\phi_1 \Omega \alpha_t) + \phi_2 - (\phi_3 \beta)\ ]^{-1}$

[NB: All right-hand-side variables in (13) are now exogenous]

(14) Real Output Growth:

$$(\delta y_t/y_{t-1}) = (\phi_1.\Omega.\mu_t) \hat{e}^*_t - (\phi_1.\Omega.\mu_t + \phi_2 - \phi_3 \beta) \pi_t - \phi_1.[1+\Omega(1-2\mu_t)] w\pi_t - (\phi_3.\beta) \delta i_t - (\phi_3 \beta) \pi_{t-1} + \phi_2 . \hat{G}$$

[NB: π_t as solved in (13)]

Policy-Variables Determination:

(15) Money Expansion:

$$\delta M_t = \Theta_t \mu_t [TB_{t-1} + NISA_{t-1}] e^*_t + \phi_t [NINSFD_t + B^d_{t-1} i^g_t + (a_t B^f_{t-1} - FA_{t-1}) i^f_t e_{t-1}] - \Phi B^f_o i^f_t e^*_t$$

(16) Government Debt Expansion:

$$\delta B^d_t = (1 - \Theta_t) \mu_t [TB_{t-1} + NISA_{t-1}] e^*_t + (1-\phi_t) [NINSFD_t + B^d_{t-1} i^g_t + (a_t B^f_{t-1} - FA_{t-1}) \cdot i^f_t \cdot e_{t-1}]$$

(17) Foreign Debt Accummulation:

$$\delta B^f_t = (1 - a_t) B^f_{t-1} i^f_t$$

(18) CBE's Foreign Asset Accummulation:

$$\delta FA_t = \mu_t [TB_{t-1} + NISA_{t-1}]$$

(19) Blocked Account Expansion:

$$\delta BA_t = \Phi \cdot B_o^f \cdot i^f_t \cdot e^*_t$$

(20) Non-Interest Service Account Growth:

$$(\delta NISA_t / NISA_{t-1}) = EXGS + \alpha (i^d_t - \hat{e}_t - i^f_t)$$

Notation:

M^d = Demand for nominal money base
P = Domestic price level
t = Time subscript
Γ = A positive constant
y = Real GDP
σ = "Cagan's" parameter
i^d = Nominal domestic interest rate for private documents
M^s = Nominal supply of money base
M = Equilibrium nominal money base stock
π = Domestic inflation
δ = Change (e.g. $\delta x_t \equiv x_t - x_{t-1}$, for any "x")
TB = Trade balance result (in dollars)
e = Free (i.e., black) market exchange rate (L.E. per US$)
da = Total, real domestic absorption
pa = Private, real domestic absorption
ga = Government's real, domestic absorption
τ = A positive constant
β = "Financial distress" parameter
$E_{t-1()}$ = Expectations at time t-1
Ω = "Marshall-Lerner" parameter
μ = Proportion of non-interest current account (NICA) result surrendered at C.B.E.
$\hat{e}^*$ = Devaluation of C.B.E.'s exchange rate
$\hat{e}$ = Devaluation of free exchange rate
$w\pi$ = World inflation
G = Government's nominal domestic absorption
A_p = Private, nominal domestic absorption
Θ = Proportion of Central-Bank absorbed foreign sector result that gets monetized (i.e., non-sterilized)
NISA = Non-interest service account (Suez, tourism, workers' remitances, etc.) (in dollars)
NICA = TB + NISA
ϕ = Proportion of total non-social-security financed deficit that gets monetized
NINSFD= Non-interest, net of social security financing and foreign financing fiscal deficit
B^d = Outstanding stock of Government's (and CBE's) domestic debt
i^g = Nominal, average interest rate on domestic government debt
a = Arrear factor (i.e., proportion of foreign due interests actually paid)
FA = Foreign assets of C.B.E. (in dollars)
Φ = Proportion of foreign debt held by public companies and authorities at base year (all due interest paid into blocked account)
B^f = Outstanding stock of foreign debt for which C.B.E. is (ultimate) payment agent

i^f = Foreign interest rate
BA = Blocked account
EXGS = "Exogenous" growth in the NISA
μ = Uncovered interest parity parameter

Notes:

1. The free (i.e. black) exchange rate follows P.P.P.
2. Uncovered interest parity parameter proxis for degree of capital mobility.
3. It is up to the policy maker to choose: NINSFD, e^*, θ, μ, ϕ, i^g, i^d, a.

Starting and Parameter Values Used in (Final Version of) the Simulation

A) Initial Values (1990 - Billions of L.E. or otherwise indicated):

M_s = 17
B^d = 38
B^f = 51 (US$ billion)
TB = -7 (US$ billion)
NISA = 7.5 (US$ billion)
FA = 3 (US$ billion)
y = 90.2
e_* = 2.85 (L.E. per US$)
e^* = 2.685 (L.E. per US$)
π = 30% per annum
i^d = 16% per annum
i^g = 7.8% per annum
BA = 15
ga = 17.05
pa = 93.1

B) Parameter Values:

θ = 0.9 , for all t
μ = 0.8 , for all t
ϕ = 0.9 , for all t
i^g = is increased to 8% in FY91 and kept constant thereafter
i^d = 25, 20, 15% in FY91-to-FY93, respectively
e* = is increased to 3.60 L.E. per US$ in FY91, and kept in line with inflation thereafter
Ω = 0.2
β = 0.2
σ = 0.6

EXGS = 3% per annum
α = 0.25
Φ = 0.87
a = 0.5 (for all "t", as compared with effective 0.1 in FY90)

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